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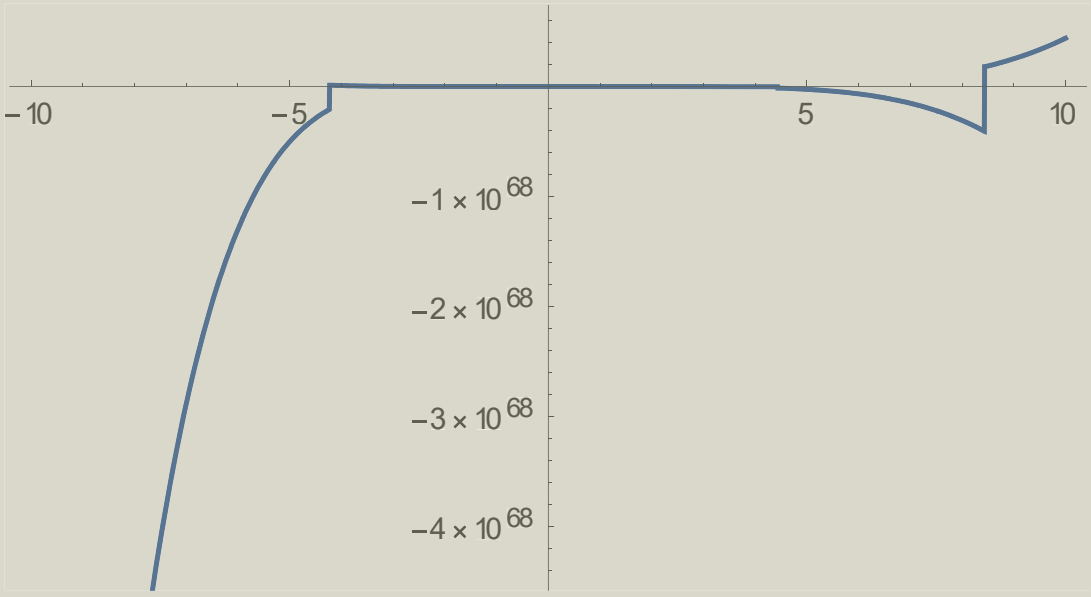

Let The Wind Blow

PHYSICS OF WAVE AND ONLY WAVE

pons

Victor Christianto | Florentin Smarandache

Let The Wind Blow

PHYSICS OF WAVE AND ONLY WAVE

"Angin bertiup ke mana ia mau, dan engkau mendengar bunyinya,
Tetapi engkau tidak tahu dari mana ia datang atau ke mana ia pergi.
Demikianlah halnya dengan tiap-tiap orang yang lahir dari Roh." (Yoh. 3:8)

***

"The wind blows wherever it pleases.
You hear its sound,
But you cannot tell where it comes or where it is going.
So it is everyone born of the Spirit." (John 3:8, NIV)

Victor Christianto | Florentin Smarandache

Let The Wind Blow

PHYSICS OF WAVE AND ONLY WAVE

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Preface

(almost) "*everything and nothing*"

Victor Christianto

Thank you for picking up an uncompromising and unconventional book like this. This book is a compilation of some rather old papers and some new papers, by myself and also Prof. Florentin Smarandache.[1] In some papers, we also join working with other colleagues, e.g. Dr. Volodymyr Krasnoholovets from IOP Ukraine, Sergey Ershkov (MSU, Moscow), and Dr. Yunita Umniyati.

This compilation is inspired from a series of seminars by Rev. Jan Friso from Kingdom Impact[2], and also a discussion with Minister Dr. Robby Chandra.

Yes, we chose the title: "Let the wind blow" as these words contain multiple meanings:
- to let the wave physics to flow freely including in energy research, medicine etc.
- to let the Spirit to pour on everyone…

The message of this book is quite simple: we wish return a healthy dose of "realism" and "wave only" physics back into modern sciences. And if that will require us to debunk quantum mechanics and relativity, so be it. And that is the theme of our book.

[1] http://fs.gallup.unm.edu/FS.htm
[2] http://www.kingdomimpact.nl

We understand that you may have objection on how we mix science and spirit.

Thanks to those that are serious scientists who defend the right to be believer while keeping as a scientist, for example: Prof. Alister McGrath,[7] Prof. John Lennox,[8] Prof. John Polkinghorne, Prof. William Lane Craig,[9] and others.

Yes, our approach is unconventional as a science book. But as you will read in chapter 3, Neutrosophic logic implies that one may choose intermediate state between science and religion. It is not a binary choice, we can choose both to be a good scientist and as a spiritual person.

The bottom line is through this book we want to make a case that regardless of what those new atheists told you, *it is possible to respect God while still being good scientists.*

In this book, we try to make our case through examples in different fields of science, including missiology, ecclesiology,[10] and also medicine and economics theorizing. We try to be (almost) everything for everyone, while keep being humble as two unprofitable servants. That way we would quote the title of Borges' short story: *Everything and nothing*.

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[6] Richard Dawkins, *The God Delusion* (Boston: Houghton Mifflin, 2006).
[7] http://svetlost.org/podaci/the_dawkins_delusion.pdf
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[9] https://www.reasonablefaith.org/writings/popular-writings/existence-nature-of-god/dawkins-delusion/
[10] Ecclesiology study management and theology of church. Some people call it as churchology. Missiology study the art and practice of doing mission. Traditionally people interpret mission as going to a tribe and preach. But modern interpretation is that we serve a specific group of people, like adult or youth. It is also mission.

***

All in all, we are also grateful to a number of colleagues, including Prof. Thee Houw Liong, Prof. Liek Wilardjo, Prof. Atmonobudi Soebagyo, Dr. David Widihandojo, Sujarwo Silas & Linda, Dr. Wonsuk Ma, Minister Gatut Budiyono, Minister Gani Wiyono, Dr. Yonky Karman, Dr. Joas Adiprasetya, Dr. Paskalis Edwin Nyoman Paska, Minister Yulia Oeniyati, Prof. Akira Kanda, Dr. Carmen Wrede, Mrs. Hiroko Morioka, Prof. Jose Carlos Tiago Oliveira and Prof. Gusto Gadama, and many others, who often encouraged and reminded us to keep on being faithful in this darkness time.

As a last note, we also thank to Spirit who always guide us in our way, especially whenever we were lost of our path to find the truth. That is why this book with title: *Let The Wind blow* is dedicated to Holy Spirit.

Let us pray that the Spirit will be poured once again in our time, as said by Joel:

> *And it shall come to pass afterward, that I will pour out my spirit on all flesh; and your sons and your daughters shall prophesy, your old men shall dream dreams, your young men shall see visions. (Joel 2:28)*[11]

We invite you to come along with this journey with us, to explore new unexplored lands in theoretical and applied physics and related science. And how to fear of God while being a good scientist.

Soli Deo Gloria.

[11] http://biblehub.com/commentaries/joel/2-28.htm

Quote:

Everything and Nothing: J. L. Borges[12]

There was no one in him; behind his face (which even in the poor paintings of the period is unlike any other) and his words, which were copious, imaginative, and emotional, there was nothing but a little chill, a dream not dreamed by anyone. At first he thought everyone was like him, but the puzzled look on a friend's face when he remarked on that emptiness told him he was mistaken and convinced him forever that an individual must not differ from his species. Occasionally he thought he would find in books the cure for his ill, and so he learned the small Latin and less Greek of which a contemporary was to speak. Later he thought that in the exercise of an elemental human rite he might well find what he sought, and he let himself be initiated by Anne Hathaway one long June afternoon. At twenty-odd he went to London. Instinctively, he had already trained himself in the habit of pretending that he was someone, so it would not be discovered that he was no one. In London he hit upon the profession to which he was predestined, that of the actor, who plays on stage at being someone else. His playacting taught him a singular happiness, perhaps the first he had known; but when the last line was applauded and the last corpse removed from the stage, the hated sense of unreality came over him again. He ceased to be Ferrex or Tamburlaine and again became a nobody. Trapped, he fell to imagining other heroes and other tragic tales. Thus, while in London's bawdyhouses and taverns his body fulfilled its destiny as body, the soul that dwelled in it was Caesar, failing to heed the augurer's admonition, and Juliet, detesting the lark, and Macbeth, conversing on the heath with the witches, who are also the fates. Nobody was ever as many men as that man, who like the Egyptian Proteus managed to exhaust all the possible shapes of being. At times he slipped into some corner of his work a confession, certain that it would not be deciphered; Richard affirms that in his single person he plays many parts, and Iago says with strange words, "I am not what I am." His passages on the fundamental identity of existing, dreaming, and acting are famous.

Twenty years he persisted in that controlled hallucination, but one morning he was overcome by the surfeit and the horror of being so many kings who die by the sword and so many unhappy lovers who converge, diverge, and melodiously agonize. That same day he disposed of his theater. Before a week was out he had returned to the village of his birth, where he recovered the trees and the river of his childhood; and he did not bind them to those others his muse had celebrated, those made illustrious by mythological allusions and Latin phrases. He had to be someone; he became a retired impresario who has made his fortune and who interests himself in loans, lawsuits, and petty usury. In this character he dictated the arid final will and testament that we know, deliberately excluding from it every trace of emotion and of literature. Friends from London used to visit his retreat, and for them he would take on again the role of poet.

The story goes that, before or after he died, he found himself before God and he said: "I, who have been so many men in vain, want to be one man: myself." The voice of God replied from a whirlwind: "Neither am I one self; I dreamed the world as you dreamed your work, my Shakespeare, and among the shapes of my dream are you, who, like me, are many persons—and none."

[From *Dreamtigers*, by Jorge Luis Borges, translated by Mildred Boyer]

[12] https://thefloatinglibrary.com/2008/07/30/everything-and-nothing-edit/

On preparation for the Second Coming of Jesus Christ

Victor Christianto

What God promised to tell me to do as the Elijah for the End of Times.

*And now He fulfill His promise, because this is the end of Times.

Note: Believe it or not, this article was written very carefully under guidance of Holy Spirit, because I do not know the meaning and unprepared to become a prophet of God. But thanks God, He is full of mercy.

Beginning

God call me in Oct. 2009 as His prophet in order to prepare so many people in His body of churches and nations for the End of Times. Before that, God asked me three times: "Do you love Me? Then shepherd My lambs." And I replied, "Yes, God. You know that I love You." At the time, I remembered that classic conversation between Jesus and Peter in John chapter 21. I tried to see how the relation of Jesus's question to Peter and God's question to me, but it is mystery.

Initially, I was so enthusiastic with this unexpected job from God to become His prophet, and at the time, a part of me said that it is a very rare job offer.

Why? Because I have not been before being an employee at governor office, or president office, then suddenly God offered me a coolest job possible: to be His prophet to prepare many chruches in the world for the Second Coming of Jesus Christ. Who will not be moved by God when He come and touch you? Just quickly recalled a few of them who were so moved by God the Most High as recorded in the Holy Bible: Enoch, Noah, Abraham, Moses, Gideon, Samuel, David, Elijah, Elisa, Daniel, Ezekiel, Jeremy, Isaiah and also Mary, Elizabeth, Peter and other first disciples, and Paul and then many people of God since then.

Like believers of Azusa Street Movement in California around 1906-1908, who were so filled with Holy Spirit, then they decided to buy one way ticket to go to so many different countries. They did not have any mission body backup or any foreign language preparation to go to other nations, but they did it because they were so moved by God.

So did I, without a plan at all, I decided to stop from my work, and moved to my parents' hometown in East Java, Indonesia, because God told me to serve back in my local church where I grew up with since my childhood.

I was not prepared at all to do such an immense task of being His prophet to reach so many people from all nations in the world. But I just believed that God will prepare me to fulfill His calling.

Frustration

Each day between 2009-2011 God help me to write many pastoral letters. Then I tried to send those letters to some institutions and international newspapers via emails. Numerous emails were sent. But all were rejected, probably that nobody care about preparing for the End of Times.

As a result of that failure, in the beginning of 2011, I felt some kind of frustration of my situation. Therefore, I stopped my morning activities like writing letters.

That was my mistake: "frustrated."

God prepared me

Then I began to take a post-graduate theology education in my hometown.

Along my study of theology, God teach me so many things through all lecturers and also friends whom I met during classes.

He prepared me for doing an impossible job as His prophet.

Thanks God for helping me to complete this theology study.

Distractions

After graduation day, I began to look for new jobs. But my effort to get a descent ministry job, failed miserably. I did not know exactly what should I do?

This was when I became gradually follow too many distractions. I worked on other things without seeking God's face in my life.

That is why I lose focus on how to fulfill my task as His prophet in the End of Times.

That was my mistake: "distracted."

How I fall again

After loosing focus on God's calling to become His prophet, I became so distracted and getting more distracted. I did not spend one hour in each morning to sit in the feet of Jesus to listen to Him anymore. I became totally forgot my calling as God's servant to prepare His churches for the Second Coming of Jesus Christ which is very near.

Then I fall again into my old habits such as spending too much time for leisures etc.

Practically, I leave behind God's way of living. I was totally lost, but I felt that I was doing fine. I did not know that I have made terrible mistakes to God the Most High.

God saved me again

Then, suddenly in one morning last week (16/10/2017), I woke up and felt very weak. I cannot eat and almost cannot walk, and I did not know what was wrong. But deep inside my heart, I realized that there should be a reason for this illness.

It was really painful, and at a point I felt that I was going to die. But God spoke to me: "Do not worry, you will not die. You will live."

Thanks God, after two days I can walk and then meet a doctor, then she gave me a prescription. Then after taking pills of that prescription, gradually I got back healthiness and getting into recovery.

In Friday morning (20/10/2017), I can eat a plate of hot rice again. I felt so happy and relieved.

God renew His calling to me

In Saturday morning (21/10/2017), I felt much better and fully recovered from illnesses.
Around afternoon, suddenly Holy Spirit spoke to me very fast, continuously, just like a flood. I realized that I have made terrible mistakes to God.
In essence, God is very angry at me. Yes, He love me but He is very disappointed because I almost did not do anything properly during the last 8 years since 2009 to prepare His churches all around the world for His Second Coming, which is going to take place very soon.
I realized that I was frustrated, then distracted, then became completely lost of His way.
I was so blind then I have failed Him again.
But praise God, He is very full of mercy and forgiveness. God forgive my mistakes and stupidity, then He renew His calling to me to become His prophet for the End of Times.
Now, I am completely born-again. (Read the Gospel of John, chapter 3).
And now I am fully committed to not fail Him again. I decided to focus and follow Him only. I will devote my rest of life to listen to God each minute, each hour, day by day.
I know that God want me to grow up in inner spirituality and getting mature in spirit, and become a child of God. God promise to guide me, teach me, and lead me minute by minute, so I can fulfill my calling as His prophet in the End of Times.

That is a story of a totally useless servant.

"So likewise ye, when ye shall have done all those things which are commanded you, say, We are unprofitable servants: we have done that which was our duty to do."
(Read Luke 17:10.)

Conclusion
I was appointed to become God's prophet in 2009, but I got frustrated, distracted, go astray, then totally was lost and fall again. I did not do my calling properly as a prophet of God the Most High.
But thanks God, He is very kind and full of mercy to a wreck like me. He renew His calling then offer me a second chance to be His prophet.
Now I am bornagain, completely new, and fully committed and dedicated to fulfill my calling as His prophet in order to prepare His churches in all nations and tribes in this World for the Second Coming of Jesus Christ.
Thanks to God the Almighty, for giving me this second chance to become His prophet.
I will not fail Him again. God help me and guide me to fulfill this immense task.

Amen.

Monday night, 23 October 2017, pk. 23:36

from a useless servant of God,
Victor Christianto

---

*Urgent Message from God the Most High for all nations and tribes:

"This is the message from God the Most High, who reign from eternity to eternity:

God the Most High is very angry to the entire world. Yes, all of you, all people from all nations and all tribes, including all governments both small and large. I, God the Most High, created and own all living beings in earth, all entities and objects in earth, all water and land and oxygen and sky, including all of you human beings, both live and dead.
Deep in your heart, all you know that you should worship God the Most High, with all your heart, all your sould, all your mind.

"Jesus said unto him, Thou shalt love the Lord thy God with all thy heart, and with all thy soul, and with all thy mind."
(Matthew 22:37).

But all of you do not live properly with full respect and fear to God the Most High.
After waiting for all of you since long time, now I decided to end it all very soon. All people from all nations and all ethnics and all languages should know very well that the End of Times is very near.
The Wrath of God is coming very soon to your world. Therefore, all of you should prepare for these Wrath. Only few will be saved.
The Age of Gracefullness was over, now begins the Age of Repentance. Therefore, all of you should repent, pray, fast properly, turn back from all your evil ways, then come to Me, God the Most High, as quick as you can.

Return to God, o all corners of the world. Period."

Note: All children and servants of God the Most High who have heard this message from Me, God the Most High, have obligation to translate it to as many foreign languages as possible, then copy it as multiple times possible, then distribute this message to as many people with all accessible languages as possible, with all forms of telecommunication and information devices that are available to you (telex, facsimile, cellular phone, smart phone, tablet, radio, television channels, email, twitter, instagram, and many others), as quickly as you can: to all your family and wifes/husbands and children, to all your relatives, to your office friends, to municipal employees in your towns, to your government officers, to your presidents or kings or queens, to all police officers, to all military officers, to people in villages in remote areas near your town, to all native tribes in remote areas and high mountains. All people from all nations and all ethnics and all languages should know very well that the End of Times is very near.

Added little note: Why me?

To all readers who are still asking questions like: Who are you? And Why are you chosen to become a prophet of God?

A simple answer is that : me do not know, either.
But allow me to tell you a little background of me, just as per necessary.
I was just an ordinary boy. I was born in a small town, around 1969.
Then I took back school, and when I was young boy, I liked to sing in a church choir, and school choir. Nothing really special in this period, except that one morning when I was 9 or 10, my father gave us a challenge: whoever can complete reading the Bible book thoroughly from Genesis to Revelation within one year, then he will give a gift.
At the time, I was quite motivated, therefore since then I spent each night to read the Bible competely. I started with Genesis, and moved one chapter by one chapter, until I finished in around a year with the book of Revelation.
Then I talked to my father that I just completed the Bible in one year as he requested. But my father has completely forgotten his challenge one year before, and he did not say anything to me regarding this.
But it was okay for me, then I moved on with my life.
Then I took junior high school (1981-1984) and senior high school (1984-1987) in the same local hometown.
Again, i was ordinary boy, nothing special in this period, except at age around 17, somehow I became more interested in religious matters. I started to attend night class sessions in church. The classes were about how to do evangelism properly. I attended that classes each week regularly, then gradually I decided to take more time in private bible study. I started to study the Bible, and put notes on each chapter that I was studying. The notes began very simple, then gradually these notes become more and more lengthy. I was more and more absorbed in this activity, until I almost forgot to do daily tasks like attending classes, etc.
At a point, I realised that I cannot complete this immense task of writing Bible commentary of the whole Bible. Then I stopped it.
Then I started to realise that my college study was at the brink of failure, so I decided to catch up, and focus on my study until my scores were getting improved, and finally I completed bachelor in technical study in September, 1992.
Afterward, I went to Jakarta to start work as a civil engineer. That was the beginning of my career as engineer.
I can continue this story, but you will find it very boredom. So I must stop it here.

As conclusion, God is very good to me, and He really took care of me. He is the Good Shepherd. I shall not want. Read Psalm 23.

The story above was actual short biography of me
This article was written under special guidance of Holy Spirit

From a useless servant of God,
Victor Christianto

The Twelve Commandments:

An extension of Szilard's Ten Commandments

Victor Christianto

Abstract

In their pursuit of new theories, physicists often need a guideline like a lamp shedding light on their way. Such a guideline has been proposed by renowned Hungarian physicist Szilard, called "*Szilard's 10 commandments*." Here we add two more additional commandments, in the light of new critics to string theory and its variations like superstring and M-theory.

Introduction

There are numerous versions of the legend of the Commandments that God gave to Moses. A humorous version of this legend told that actually God came to Italian people first, and He asked: "Would you accept My commandments?" "Like what?" they asked Him. God answered them: "Like: Thou shall *not* kill." "Oh, no. Thank You, God. We cannot accept Your Commandment. We are Italian, and many of us are mafia here, then we often kill each other." Then God came to French people, then He asked the same question: "Would you accept My commandments?" "Like what?" they asked Him. God answered them: "Like: Thou shall *not* commit adultery." "Oh, no. Thank You, God. We cannot accept Your Commandment. We are French, and many of us here like to do adultery." Then God came to Israeli people, then He asked the same question: "Would you accept My commandments?" They asked Him: "How much is it?" God replied: "All are free." Then they replied: "All right then, please give us ten."

Another version of that legend told that there were originally more than the *Ten Commandments* that God gave to Moses. As Moses came down from Mount Sinai carrying the heavy stones upon which the words were written, some have said he stumbled and fell and the stones were smashed. Several of the tablets were broken beyond repair, and only ten of the commandments survived. The

fragments of the missing and garbled commandments may have been rediscovered by a Hungarian, Jewish, atomic physicist named L. Szilard. [1]

They are called "*Szilard's 10 commandments*." He wrote them in German with no thought, at the time, of publishing them. During Szilard's lifetime, he was never happy with the attempts to translate the commandments into English, so they were never published while he was alive. After his death in 1964, Jacob Bronowski wrote them down in English as a remembrance for some of Szilard's friends.[1]

Here we add 2 more additional commandments, in the light of new critics to string theory and its variations like superstring and M-theory. Such critics to string theory came mostly from mathematicians, such as Sir Roger Penrose and Peter Woyt.[2][3]

Now it seems worth to remind ourselves to a wisdom saying by Ronald Coase, a Nobel laureate in economics. He once remarked:[4]

"*if you torture data long enough, it will confess to anything."*

For theoretical and mathematical physicists, data can be changed to be "geometry", because most of them like geometry (especially supradimensionality in string theory, cf. Penrose).

Therefore if we condense those criticism into one line, it would be as follows:

"*if you torture geometry long enough, Nature will confess to anything."*

Therefore, our proposed 11th commandment is:

- *Do not torture geometry, try to respect and learn from Nature.*

As with the 12th commandment: we would like to add a rule that a scientist should not make a pact with Satan. This one refers to the so-called *Faustian bargain* in nuclear energy, which term has been advocated by the late Alvin Weinberg.[5]

Below is the complete list of Szilard's 10 commandments with our additional 11th and 12th commandments.

The 12 Commandments for Physicists

1. Recognize the relationships between things and the laws which govern men's actions, so that you know what you are doing.

2. Direct your deeds to a worthy goal, but do not ask if they will achieve the goal; let them be models and examples rather than means to an end.

3. Speak to all others as you do to yourself, without regard to the effect you make, so that you do not expel them from your world and in your isolation lose sight of the meaning of life and the perfection of the creation.

4. Do not destroy what you cannot create.

5. Touch no dish unless you are hungry. (A pun that could read: Do not turn to the court of law unless you are hungry).

6. Do not desire what you cannot have.

7. Do not lie without need.

8. Honor children. Listen to their words with reverence and speak to them with endless love.

9. Do your work for six years; but in the seventh, go into solitude or among strangers, so that the memory of your friends does not prevent you from being what you have become.

10. Lead your life with a gentle hand and be ready to depart whenever you are called.

11. Do not torture geometry, try to respect and learn from Nature.

12. Do not make a pact with Satan. Fear of God should be the beginning of your knowledge.

Concluding remarks

We hope this short article may inspire younger generation of physicists and mathematicians to rethink and renew their approaches to Nature, and perhaps it may also help to generate new theories which will be useful for a better future of mankind.

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How a synthesizer works

Victor Christianto, Florentin Smarandache

Abstract

In their classic book, *The art of thinking*, Robert Bramson and Allen Harrison describe five thinking styles that one tends to adopt: pragmatist, analyst, realist, synthesist, and idealist. In this paper, we tell our story on thinking modes we often use, and sometimes we took a *synthesizer* mode, i.e. to combine three or four of the above thinking styles. We present some examples too. We hope this retelling may be useful for young scientists and mathematicians in developing new theories either in theoretical physics and cosmology.

Introduction: Review of 5 thinking modes

Scientists in all fields need to adopt certain thinking modes, and analytical way is not necessarily to be the only approach he/she can adopt. In this regards, it seems worth to see 5 thinking styles of Bramson & Harrison. In this introductory section, allow us to quote in full an article by Carol Krucoff in Washington Post [4]:

By Carol Krucoff April 5, 1982

Over the past five years, Robert Bramson has asked several thousand people what seems like a simple question: "How do you think about things?"

"Most people find this extremely difficult to answer," says the 56-year-old organizational psychologist. "The typical response is a surprised stare, a blank look and words like, 'What do you mean, how do I think? I just think, that's all, as anybody else does.' "

What most people don't realize, Bramson says, is that "*in our Western world there are five distinct approaches to thinking: Synthesist, Idealist, Pragmatist, Analyst and Realist*. Each is useful in a given situation, but can be catastrophic if overused or used inappropriately. Yet almost all of us learn only one or two sets of strategies, and we go through life using them no matter what the situation.

"All around us we see people achieving success using strategies very different from our own. But despite the evidence, we persist in the ways that we believe work for us. We impose our own limitations, and we find it hard to understand those who persist in their own peculiar methods."

Psychologists call this human tendency "assuming similarity."

"In the absence of evidence to the contrary," says Bramson, "most people, most of the time assume others are just like them--only a little defective. Or, if their self-esteem is low, they think others are just like them only a little superior."

Bramson began researching styles of thinking in 1975 while trying to discover "why intelligent managers make terrible decisions." He and colleagues at their Berkeley, Calif., management-consulting firm uncovered two major studies relevant to the "problem-solving" issue: Philosopher C. West Churchman had identified five "inquiry modes" used by scientists, and Harvard professor Jerome Bruner had described four "conceptual strategies."

From this and other research (including Aristotle's description of the four different approaches to arguing) they isolated five styles of thinking and developed a test to determine thinking-style preference. In five years of conducting workshops and testing several thousand people--mostly white-collar professionals--they have isolated these characteristics of each style:

* *Idealists*: Receptive and inquiring. Tend to focus on similarities among people and try to assimilate disparate views into a solution that will have something for everyone. Ethical, future-oriented and concerned with social values and goals. Excel in articulating goals and seeing the broad picture, but may try too hard for "perfect" solutions and screen out hard data and details.

Under stress, idealists often look hurt.

Analysts: Detail-oriented. Approach problems in a careful and methodical way. Gather as much information as possible before making a decision and look for the "one best way" to proceed. View themselves as factual, down-to-earth, practical people and view the world as logical, ordered and predictable. May screen out values and subjective factors and can appear inflexible and overly cautious.

Cool, studious and often hard to read, analysts under stress often withdraw.

* *Pragmatists*: Flexible and adaptive. Focus on the shortest route to the payoff and excel at finding new ways of doing things with materials at hand. Believe the world is neither predictable nor understandable and are interested in "whatever works." May seem unpredictable, but tend to have well-developed social skills and are often well-liked.

Under stress, pragmatists may look bored.

* *Synthesists*: Like to rearrange seemingly disparate things into new, creative combinations. Habitually question people's basic assumptions about things and enjoy philosophical arguments. Not likely to be interested in compromise or consensus.. Best in controversial, conflict-laden situations. May be labeled as "troublemakers."

Under stress, synthesists tend to poke fun.

* *Realists*: View "reality" as whatever they can feel, smell, see, hear or experience. Believe that any two intelligent people ought to agree on the facts, and if something is wrong, want to fix it. Have a need to achieve and be in control. Pride themselves on incisiveness and can become impatient easily. Good at simplifying a problem and providing drive and momentum, but may try too hard for consensus and rush to over-simplified solutions.

Realists under stress become agitated.

The most popular style of thinking in this country, says Bramson, is Idealist with 37 percent of those tested showing that preference. Other styles, in order: Analyst (35 percent), Realist (24 percent), Pragmatist (18 percent) and Synthesist (11 percent).

"In the workplace we glorify the realists and analysts," he says, "and stomp out the synthesists. In the '60s there was a resurgence of interest in the synthesist style of thinking--which often comes up with new, fresh ideas--but today we tend to see them as troublemakers.

"In other cultures, style preferences may differ. That's something we're interested in testing. I believe there's likely a genetic bias toward one or two styles, which may be amplified or contradicted by early learning."

Sex is not a factor, Bramson claims, in the way people think. "We were surprised that we didn't find a difference in the style preference between men and women."

Occupations are, however, linked to style preferences.

"What we found," he says, "unfortunately supports the stereotypes. Social workers, for example, peak in idealist and are low in analyst, while budget officers are the exact opposite. . . Which makes it clear why the two groups often have trouble communicating. That can lead to poor use of funding."

On the basis of his study, Bramson believes that about half the population tends to rely on a single style of thinking and about 35 percent favors a combination of two styles.

Albert Einstein, he says, was probably an Analyst/Synthesist: "He had a vision, then backed it up with data." Thomas Jefferson was likely a "Synthesist/Idealist" who continually upset and confused "Analyst/Realist" Alexander Hamilton.

Ronald Reagan's style, he says, "is difficult to determine since he's so good at presenting himself . . . but he exemplifies the politician's profile: Realist/Pragmatist."

There is, stresses Bramson, no "best" style. "This is not a measure of ability, but of how you use your intellect. Each individual must stop wishing they were different, learn to be more skillful with the strengths they have and acknowledge their liabilities--which are usually simply the overuse or inappropriate use of their strengths."

Someone who learns to recognize the errors their preferred style of thinking may lead to, he says, can compensate for blind spots. The best way to broaden a style repertoire, he says, is to "link up with someone who is high in the areas you are low in and listen to them.

"My wife, who is also my partner, is a Pragmatist/Realist, low in Synthesist, while I'm a Synthesist/Realist, low in Pragmatist. She values the ideas I have as a Synthesist, but she can bring me down to earth when I've got my head in the clouds. We're sensitive to the ways we differ, try to listen and respect one another and value that different style of thinking."

How to be a Synthesizer

As Bramson argued, that each mode of thinking can be useful in certain context, and may be not so useful in other situations, therefore we also adopted a mode that you may call "Synthesizer" mode. A synthesizer (ˈsinTHəˌsīzər/) can be defined as follows:

1. an electronic musical instrument, typically operated by a keyboard, producing a wide variety of sounds by generating and combining signals of different frequencies
2. any of various electronic, sometimes portable consoles or modules, usually computerized, for creating, modifying, and combining tones or reproducing the sounds of musical instruments by controlling voltage patterns, operated by means of keyboards, joysticks, sliders, or knobs.[1]

In a similar way, we sometimes adopted 2-3 thinking styles altogether such as: Analytical/Realist/Synthesist like in Cantorian Navier-Stokes Cosmology. And sometimes Idealist/Synthesist/Analyst etc. like in Smarandache's Neutrosophic Logic. This mode is called as '*Synthesizer's way*."

In the following section we will describe a few examples how to be a Synthesizer in physical sciences and mathematics fields.

Our story

a. Neutrosophic Logic:
One of us developed a new theory called Neutrosophic Logic as an extension of Intuitionistic Fuzzy Logic.[5] Instead of working on Zadeh's

[1] *www.dictionary.com/browse/synthesizer*

Fuzzy Logic, he developed a novel way, to unify the whole logic and probability theory, with implications range far into new fields such as AI, Information Fusion, Dezer-Smarandache Theory (DSmT) etc.
Below is a summary of Neutrosophic Logic: [5]

Neutrosophic Logic is a general framework for unification of many existing logics, such as fuzzy logic (especially intuitionistic fuzzy logic), paraconsistent logic, intuitionistic logic, etc. The main idea of NL is to characterize each logical statement in a 3D Neutrosophic Space, where each dimension of the space represents respectively the truth (T), the falsehood (F), and the indeterminacy (I) of the statement under consideration, where T, I, F are standard or non-standard real subsets of $]^{-}0, 1^{+}[$ with not necessarily any connection between them.

For software engineering proposals the classical unit interval [0, 1] is used.

For single valued Neutrosophic logic, the sum of the components is:

$0 \leq t+i+f \leq 3$ when all three components are independent;

$0 \leq t+i+f \leq 2$ when two components are dependent, while the third one is independent from them;

$0 \leq t+i+f \leq 1$ when all three components are dependent.

When three or two of the components T, I, F are independent, one leaves room for incomplete information (sum < 1), paraconsistent and contradictory information (sum > 1), or complete information (sum = 1).

If all three components T, I, F are dependent, then similarly one leaves room for incomplete information (sum < 1), or complete information (sum = 1).

b. Cantorian Navier-Stokes Cosmology:
Around mid of 2002 one of us tried to rekindle the superfluid interstellar medium in astrophysics, but after studying some existing papers, he ended up in superfluid quantized vortices model of the Solar System.[6] He argued that the Universe can be modelled by Navier-Stokes equations, which reduce to superfluid quantised vortices. It was quite rare at the time to come up with a whole new idea in astrophysics, connecting NS equations and superfluidity, but now the use of NS into superfluidity context becomes more common.[9][10]

Among our result there was a prediction of 3 new planetoids beyond Pluto orbit, which then the three new orbits have been found to be inhabited by new planetoids, like Sedna.

c. Retro-Classical Physics

This is a new term we argued in a paper discussing how we can work out new theories beyond the subjective-idealism tendency of Relativity Theory and Quantum Mechanics. Interested readers are advised to see our paper [7]. See also [8].

Concluding remarks

In the last 10-11 years, we have published more than ten books in this area of quantized astrophysics and also Neutrosophic Logic. Although there were different thinking modes between us (as mathematician and as a nocturnal physicist), we chose to publish rather than perish.

We hope this short article may inspire younger generation of physicists and mathematicians to rethink and furnish their approaches to Nature, and perhaps it may also help to generate new theories which will be useful for a better future of mankind.

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Applications of Neutrosophic Membership Function in Describing Identity Dynamics in Missiology and Modern Day Ecclesiology

(An exploration in Mathematical Theology)

Victor Christianto, Florentin Smarandache

Abstract

As Paul Hiebert called it in his paper: "*The flaws of excluded middle,"* people especially in Asia and Africa can adopt a "middle Earth" view, i.e. a world where both rationality and supra-rationality can co-exist. Such an "included middle" worldview can be viewed in terms of Neutrosophic Membership Function too. Similarly the dynamics of identity change between outer faiths and Christianity is often a long and complex process, and we submit that it can be modelled as a spectrum, of which some people described the process as C1-C6. This spectrum can be viewed in terms of Neutrosophic Membership function. In this paper, we offer a fresh look at these problem using two new concepts: Liquid church and also Neutrosophic Membership function. It is our hope that our model, which may be called "*Neutrosophic Liquid Ecclesiology*," can shed some light on the interaction and dynamics in Missiology and modern day Ecclesiology, especially in Asia and Africa context. All in all, this paper may be considered as an exploration of a new subject in doing theology: *Mathematical Theology*.

Introduction: dynamics of Christian identity

The dynamics of identity between outer faiths to Christianity is often a long and complex process, and we submit that it can be modelled as a spectrum, of which some people described the process as C1-C6. This spectrum can be viewed in terms of Neutrosophic Membership function. Similarly, people especially in Asia and Africa can adopt a "middle Earth" view, i.e. a world where both rationality and supra-rationality can co-exist, as Paul Hiebert called it: "The flaws of excluded middle." Such an "included middle" worldview

can be viewed in terms of Neutrosophic Membership Function too. In this paper, we offer a fresh look at these problem using two new concepts: Liquid church and also Neutrosophic Membership function.

In the first section, we will give a short review on the Liquid Church, then we will review Neutrosophic set and membership function. Thereafter we will discuss how we can see dynamics of Christian identity through these two concepts.

What is Liquid Church?

Ward draws upon the writing of Zygmunt Bauman who explores contemporary Western culture and who notes that modernity has produced institutional expressions of church that tend to be more solid and rigid. Ward also describes various mutations of solid church that he describes as heritage site, refuge, and nostalgic community.

So he refers to the present as 'liquid modernity'. The solid ice of modernity is melting away, resulting in some big ice chunks left floating about an increasingly fluid culture. It's a helpful metaphor that effectively frames his thoughts throughout the book.

Ward's recommendation is that the church must become liquid in order to reach a liquid culture. Solid church (aka, Church as we've always known it), centered on a weekly congregational gathering, is completely irrelevant to a liquid culture that no longer utilizes a regular, weekly, social gathering as its primary method of communication and community formation. Instead, liquid culture relies on networks, communication processes based on hubs (affinity-based gathering beyond a Sunday morning service) and connecting nodes (methods of communication/participation in the network).(2)

What is Neutrosophy?

Vern Poythress argues that sometimes we need a modification of basic philosophy of mathematics, in order to re-define the redeemed mathematics. See [10]. In this context, allow us to argue in favor of Neutrosophic logic as one basic postutale, in lieu of the Aristotle logic which creates many problems in real world.

In Neutrosophy, we can connect an idea with its opposite idea and with its neutral idea and get common parts, i.e. <A> /\ <nonA> = nonempty set. The common part of the uncommon things! It is true/real... paradox. From neutrosophy, all started: neutrosophic logic, neutrosophic set, neutrosophic probability, neutrosophic statistics, neutrosophic measure, neutrosophic physics, neutrosophic algebraic structures etc.

a. Neutrosophic view on dialectics can be summarized as follows:

It is true in restricted case, i.e. the Hegelian dialectics considers only the dynamics of opposites (<A> and <antiA>), but in our everyday life, not only the opposites interact, but the neutrals <neutA> between them too. For example: you fight with a man (so you both are the opposites). But neutral people around both of you (especially the police) interfere to reconcile both of you. Neutrosophy considers the dynamics of opposites and their neutrals.

So, neutrosophy means that: <A>, <antiA> (the opposite of <A>), and <neutA> (the neutrals between <A> and <antiA>) interact among themselves.

b. What is Neutrosophic membership function?

b. What is Neutrosophic membership function?

A neutrosophic set is characterized by a truth-membership function (T), an indeterminacy-membership function (I), and a falsity-membership function (F),

where T, I, F are subsets of the unit interval [0, 1].

As particular cases we have: single-valued neutrosophic set {when T, I, F are crisp numbers in [0, 1]}, and interval-valued neutrosophic set {when T, I, F are intervals included in [0, 1]}.

Neutrosophic Set is a powerful structure in expressing indeterminate, vague, incomplete *and* inconsistent information. (3)

c. A lesson from Jerusalem Christianity in the First Century

It is known that the early churches especially the Jerusalem Christianity was not a monolithic congregation, instead it was composed on variety of groups: Pharisee Jews, Aramaic speaking Jews, Hellenistic Jews, and also the Gentiles. As the book of Acts told us, these groups were often in miscommunication among each others. This story can be inferred from Acts chapter 15, and also from the letter to Galatians. However, this group can also grow rapidly just because they maintain a Neutrosophic identity, or in Ward's term: Liquid ecclesiology.[1] If we are allowed to put this view on Early Church especially in Jerusalem Christianity, it is as follows:

[1]We thank to Dr. Robby Chandra for fruitful discussion on a liquid view of the Early Church. However such an assertion needs further study.

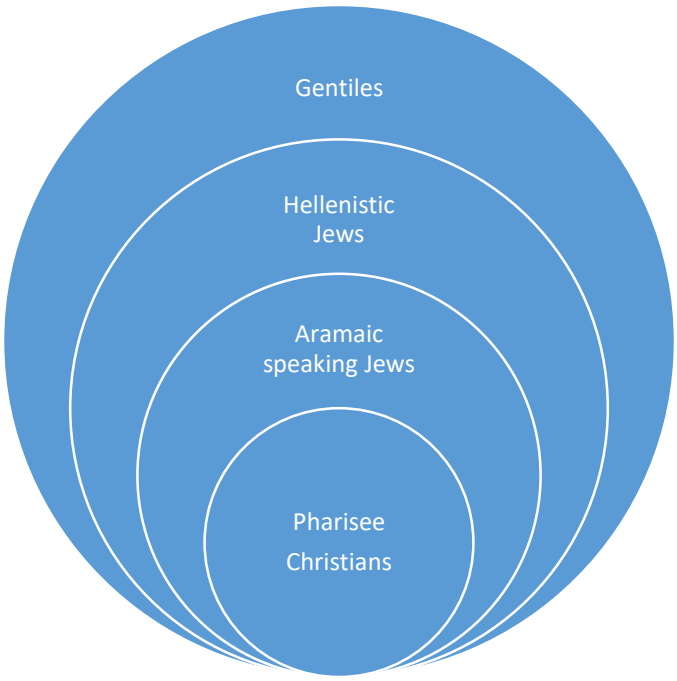

Diagram 1. The stacked diagram of Jerusalem Christianity, derived from the book of Acts

Liquid Church and Neutrosophic Membership Function's View on Dynamics of Christian Identity

According to Paul Hiebert, most people in Asia and Africa often adopt a view which accept both rationality and supra-rationality. Unfortunately, many Western-born missionaries only adopt a worldview that Christianity equals to rationality, period. As a result, Christian missionaries often oppose the mystical belief of people that they are ministering. Such a different worldview can result in many confusing problems in Missiology processes in Asia and Africa.

The integral view of humanity and spirituality, instead of two-tiered Western view of the world, appears to be more in line with majority of people in underdeveloping countries, especially in Asia and Africa. See for instance the work by Paul Hiebert [1].

Therefore we propose that such a flaw in excluded middle worldview (originated in Aristotelian logic) can be elevated if we adopt a new non-Aristotelian logic, which we call Neutrosophic logic, included with Neutrosophic Membership function. In other words, we should accept that in real world, most people accept that both rationality and supra-rationality co-exist. In other words, we are not just rational thinkers, as philosophers assumed.

In the same way, in doing Ecclesiology in this modern day Asia and Africa, we need to consider the complex identity possibilities, which can be adopted by people from outer faiths and Christianity. In other words, the distinction between those who are Christians and those who are not can be so blurred, as people can choose to be semi-Christian or half-Christian.

This process has been viewed by some studies in Missiology, as C1-C6 groups. In these groups, people feel happy because they are not pushed to become like Western churches, with Western way of life.

Therefore, we consider the following applications of Neutrosophic membership function Ecclesiology and Missiology: it is common to find that many Buddhist people are also observing Christian teaching, because they hear that Jesus's teaching may have similarity with Zen Buddhism. Or Hindu people may find similarity between Jesus and Khrisna, a mythic hero in Hindu mythology. Although Khrisna is mythical, this may be viewed as early step to become a real disciple of Jesus. This reality should be considered by anyone trying to build a mission ministry in Asia and Africa regions.

Concluding Remarks

Concluding Remarks

As Paul Hiebert called it: "The flaws of excluded middle," people especially in Asia and Africa can adopt a "middle Earth" view, i.e. a world where both rationality and supra-rationality can co-exist. Such an "included middle" worldview can be viewed in terms of Neutrosophic Membership Function. In this paper, we offer a fresh look at these problem using two new concepts: Liquid church and also Neutrosophic Membership function.

In the first section, we gave a short review on the Liquid Church, then we will review Neutrosophic set and membership function. Thereafter we discussed how we can see dynamics of Christian identity through these two concepts.

It is our hope that our model, which may be called "*Neutrosophic Liquid Ecclesiology*," can shed some light on the interaction and dynamics in Missiology and modern day Ecclesiology, especially in Asia and Africa context. All in all, this paper may be considered as an exploration of a new subject in doing theology: *Mathematical Theology*.

Acknowledgement

This paper is dedicated to our Lord and the Good Shepherd, Jesus Christ, who has reminded us that to become the true disciples require a complex process and long journey. We are also indebted to Minister Dr. Robby Chandra who has shared with us the ebook by Pete Ward, *Liquid Church*, which has enlightened us on the complexity of Christian identity problem in modern day. Special thanks to an old friend, Buce Waelaruno and his daughter, Gaby Bernadette Waelaruno, who remind one of us to the importance of doing real mission, instead of just keeping the sheeps around us (i.e. aquarium way of doing ministry).

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Reinterpreting Tlön, Uqbar, Orbis Tertius: On the Antirealism Tendency in Modern Physics

Victor Christianto, Florentin Smarandache

ABSTRACT

Borges has a rare ability to put wild ideas into detective stories with reporting style. At least that is the impression that we got on his short stories. In particular, one of his short story is worthnoting: *Tlon, Uqbar, Orbis Tertius*. The story told us about a mysterious country called Uqbar, in apparently an unofficial reprint of *Encyclopedia Britannica*. It also tells about Tlon, a mysterious planet, created purely by imaginative minds. While this story clearly criticizes Berkeley view and may be not related to our daily reality, a reinterpretation of this story leads us to a long standing discourse in the philosophy of science: to how extent the entire modern physics follow such a Berkeley-antirealism tendency? This paper is intended to bring this subject into our attention. We will also discuss shortly on the antirealism in certain trends in theoretical physics and cosmology.

Keywords: realism-antirealism discourse, modern physics, theoretical physics, modern cosmology

1. Introduction

Some years ago, one of these authors (VC) found a copy of collected works of Jorge Luis Borges. He found the book is quite strange compared to other fiction books. But only recently, he realizes that Borges may have some hidden messages to say to his readers. In particular in his short story: *Tlön, Uqbar, Orbis Tertius* [1], Borges was probably rather anxious on certain trends in modern science, i.e. that a bunch of academic luminaries may be trying to create a new world or planet out of pure fantasy. To quote his own sentence: *"the article said that the literature of Uqbar was a literature of fantasy, and that its epics and legends never referred to reality but rather to the two imaginary realms of Mlekhnas*

and Tlön." [1, p. 37] Those people may push the imagination up to a point that they published: "*A first encyclopaedia of Tlön. Vol. XI. Hlaer to Jangr*." [1]. Tlön is an unknown planet, it was created out of pure fantasy. The planet has presupposed idealism, just like in Berkeley's philosophy.

The problem is what will happen if hard sciences such as particle physics, mathematical physics, astronomy, and cosmology also try to put Berkeley view seriously? To how extent we can mix up cold reality with pure fantasy?[1]

At first, we are not so sure about how extent the entire modern physics has been influenced by antirealism tendency. But, then we heard that Sir Roger Penrose has just released his new book, with a quite provocative title: "*Fashion, faith and fantasy*…"[2]. We did not read yet his new book, but we have read his preface of this book. And we think: Now, we found someone, a quite authoritative figure in theoretical physics, who think in introspective mode. So, we dedicate this paper to Sir Roger Penrose.

It is our hope that our discussion here can bring you to a point where you begin to realize and consider the antirealism tendency in modern physics more seriously.

2. Tlön and the Moon

In his short story, Borges mentioned briefly about the Moon in Tlön. He wrote that there is no noun for moon in Tlön, but there are verbs which mean something like "moonate" or "enmoon."[1] Such an idealistic perception of the Moon, reminds us to a famous phrase by Mermin, while he describes quantum mechanics view: "*The moon is not there while nobody looks at*." This phrase captures the essence of one of central dogmas of the

[1] This paper is not intended to discuss realism-antirealism debates over the past few decades. We only discuss antirealism tendency which seems to plague modern physics. If the readers want to read more deeply into this subject, there are good papers such as by Nancy Cartwright [10] and also by Alvin Plantinga [11].

Copenhagen interpretation of QM, i.e. that the observer determines the outcome of the experiments. In other words, in Copenhagen's view: *the reality is observer-dependent*. The problem with this dogma is that it does not work for the Moon. Even if at certain moments in a day, all inhabitants in this Earth decide to not-looking at the Moon, there is certainty that the Moon will not cease to exist suddenly at the moment. In other words, we shall admit that objective reality does exist, regardless of the action of the observers. This simple story lead us to conclude that in this Earth, we must accept that the reality is not so idealistic, and that is the difference with an idealistic planet of Tlön, created out of pure fantasy.

3. Tlön and Relativity Theory

The idealistic-Berkeley attitude can be traced back to special relativity theory, which was often regarded as the beginning of modern physics. This theory has been criticized in our previous paper [4]. But now allow us to emphasize our message: that despite wide acceptance of relativity theory since 1905, it clearly has an anti-reality view. And only a few physicists have realized such a grave error, notably C.K. Thornhill [3]. In one of his remarkable papers, the late C.K. Thornhill wrote as follows: [1]

> "Relativists and cosmologists regularly refer to space-time without specifying precisely what they mean by this term. Here the two different forms of spacetime, real and imaginary, are introduced and contrasted. It is shown that, in real space-time (x, y, z, ct), Maxwell's equations have the same wave surfaces as those for sound waves in any uniform fluid at rest, and thus that Maxwell's equations are not general and invariant but, like the standard wave equation, only hold in one unique frame of reference. In other words, Maxwell's equations only apply to electromagnetic waves in a uniform ether at rest. But both Maxwell's equations and the standard wave equation, and their identical wave surfaces, transform quite properly, by Galilean transformation, into a general invariant form which applies to waves in any uniform medium moving at any constant velocity relative to the

> reference-frame. It was the mistaken idea, that Maxwell's equations and the standard wave equation should be invariant, which led, by a mathematical freak, to the Lorentz transform (which demands the non-ether concept and a universally constant wave-speed) and to special relativity. The mistake was further compounded by misinterpreting the differential equation for the wave hypercone through any point as the quadratic differential form of a Riemannian metric in imaginary space-time (x, y, z, ict). Further complications ensued when this imaginary space-time was generalised to encompass gravitation in general relativity."

According to Thornhill [3], real space-time is a four dimensional space consisting of three-dimensional space plus a fourth length dimension obtained by multiplying time by a constant speed. (This is usually taken as the constant wave-speed c of electromagnetic waves). If the four lengths, which define a four-dimensional metric (x, y, z, ict), are thought of as measured in directions mutually at right-angles, then the quadratic differential form of this metric is:[3]

$$(ds)^2 = (dx)^2 + (dy)^2 + (dz)^2 - \bar{c}^2 (dt)^2 \tag{1}$$

When the non-differential terms are removed from Maxwell's equations, i.e. when there is no charge distribution or current density, it can easily be shown that the components (E_1, E_2, E_3) of the electrical field-strength and the components (H_1, H_2, H_3) of the magnetic field-strength all satisfy the standard *wave equation*:[3]

$$\nabla \phi = \left(\frac{1}{\bar{c}^2} \right) \frac{\partial^2 \phi}{\partial t^2} \tag{2}$$

It follows immediately, therefore, that the wave surfaces of Maxwell's equations are exactly the same as those for sound waves in any uniform fluid at rest, and that Maxwell's equations can only hold in one unique reference-frame and should not remain invariant when transformed into any other reference-frame. In particular, the equation for

the envelope of all wave surfaces which pass through any point at any time is, for equation (2), and therefore also for Maxwell's equations,[3]

$$(dx)^2 + (dy)^2 + (dz)^2 = \bar{c}^2 (dt)^2 \tag{3}$$

Or

$$\frac{(dx)^2}{(dt)^2} + \frac{(dy)^2}{(dt)^2} + \frac{(dz)^2}{(dt)^2} = \bar{c}^2 \tag{4}$$

It is by no means trivial, but it is, nevertheless, not very difficult to show, by elementary standard methods, that the general integral of the differential equation (4), which passes through (x_1, y_1, z_1) at time t_1, is the right *spherical hypercone*:[3]

$$(x - x_1)^2 + (y - y\ )^2 + (z - z_1)^2 = \bar{c}^2 (t - t_1)^2 \tag{5}$$

In other words, both Maxwell equations and space itself have the *sound wave* origin.

4. Tlön and Quantum Mechanics

We admit that the Old Quantum Mechanics, i.e. Bohr's quantization rules, still kept a healthy dose of realism. But since 1926, when Erwin Schrödinger started to publish his result which then was called the Wave Mechanics, he imposed a sort of idealistic-Berkeley viewpoint, that a purely imaginary mathematical craft can explain the experiments.[6][7] We shall show here what are the errors of Schrödinger. In describing these errors of Wave Mechanics, we thank to George Sphenkov and Leonid Kreidik for their analysis of Schrödinger's work [5].

In the initial variant, the Schrodinger equation (SE) has the following form [5]:

$$\Delta\Psi + \frac{2m}{\hbar^2}\left(W + \frac{e^2}{4\pi\varepsilon_o r}\right)\Psi = 0 \tag{6}$$

The wave function satisfying the wave equation (6) is represented as:

$$\Psi = R(r)\Theta(\theta)\Phi(\varphi)T(t) = \psi(r,\theta,\varphi)T(t) \tag{7}$$

Where $\psi(r,\theta,\varphi) = R(r)\Theta(\theta)\Phi(\varphi)$ is the complex amplitude of the wave function, because

$$\Phi_m(\varphi) = C_m e^{\pm im\varphi} \tag{8}$$

For standard method of separation of variables to solve spherical SE, see for example [8-9].

The Φ, Θ and T equations were known in the theory of wave fields. Hence these equations presented nothing new. Only the R was new. Its solution turned out to be *divergent*. However, Schrödinger together with H. Weyl (1885-1955), *contrary to the logic of and all experience of theoretical physics*, artificially cut off the divergent power series of the radial function R(r) at a κ-th term. This allowed them to obtain the radial solutions, which, as a result of the cut off operation, actually were the *fictitious solutions*.[5]

Furthermore, it can be shown that the time-independent SE [6-7]:

$$\nabla\Psi + \frac{2m}{\hbar^2}(E - V)\Psi = 0, \tag{9}$$

Can be written in the form of standard wave equation [5]:

$$\nabla\Psi + k^2\Psi = 0, \tag{10}$$

Where

$$k = \pm\sqrt{\frac{2m}{\hbar^2}(E-V)}\,. \tag{11}$$

Or if we compare (10) and (6), then we have [5]:

$$k = \pm\sqrt{\frac{2m}{\hbar^2}\left(W + \frac{e^2}{4\pi\varepsilon_o r}\right)}\,. \tag{12}$$

This means that the wave number k in Schrödinger's radial wave equation is a quantity that varies continuously in the radial direction. Is it possible to imagine a field where the wave number, and hence the frequency, change from one point to another in the space of the field? Of course, it is not possible. Such wave objects do not exist in nature.

The *unphysical* nature of Schrödinger's wavefunction has created all confusing debates throughout 90 years. But such a deep problem is rarely discussed in QM textbooks, on how he arrived at his equation.

Moreover, there is also a deep *logical fallacy* made by Schrödinger:[2] It is known that Schrödinger began with Einstein's mass-energy relation then he proceeded with Hamilton-Jacobian equation. At first he came to a similar version of Klein-Gordon equation, but then he arrived to a new equation which is non-relativistic. Logically speaking, he began with a relativistic assumption and he came to a non-relativistic expression. That is *logically inconsistent* and therefore unacceptable, and Schrödinger

[2] We thank to Prof. Akira Kanda for pointing out this logical error of Schrodinger's procedure.

himself never knew where the problem lies. Until now physicists remain debating the problem of the meaning of his wavefunction, but they forget that it starts with unphysical nature of his equation. This is a common attitude of many young physicists who tend to neglect the process and logical implication of QM derivation, and they never asked whether Schrödinger equation has deep logical inconsistency or not. (The problem becomes more persistent, because most physics professors do not like such a deep philosophical question on QM. Usually they will respond: "*Shut up and calculate*.")

On experimental level, there are some limitations in applying Schrödinger equation to experiments, although many textbooks on QM usually overlook existing problems on how to compare 3D spherical solution of Schrödinger equation with experimental data. The contradiction between QM and experiments are never discussed publicly, and this is why most modern physicists hold the assertion that QM describes accurately "ALL" physical experiments; but that is an unfounded assumption. Alternatively, George Shpenkov began with classical wave equation and he is able to derive a periodic table of elements which is very close to Mendeleev's table. And this is a remarkable achievement which cannot be done with standard Wave Mechanics.[3]

[3] For further discussion, it is advisable to check the website of Dr. George Shpenkov, at http://shpenkov.janmax.com. See especially Shpenkov, George P. 2013. *Dialectical View of the World: The Wave Model (Selected Lectures).* Volume I: Philosophical and Mathematical Background. URL: http://shpenkov.janmax.com/Vol.1.Dialectics.pdf

5. Tlön and Theoretical Physics

Nancy Cartwright is Associate Professor of Philosophy from Stanford University. She wrote an interesting book with quite interesting title: **How The Laws of Physics Lie**. The following paragraph is a quote from the first page of her book:

> "Nancy Cartwright argues for a novel conception of the role of fundamental scientific laws in modern natural science. If we attend closely to the manner in which theoretical laws figure in the practice of science, we see that despite their great explanatory power these laws do not describe reality. Instead, fundamental laws describe highly idealized objects in models. Thus, the correct account of explanation in science is not the traditional covering law view, but the 'simulacrum' account. On this view, explanation is a matter of constructing a model that may employ, but need not be consistent with, a theoretical framework, in which phenomenological laws that are true of the empirical case in question can be derived. *Anti-realism* about theoretical laws does not, however, commit one to anti-realism about theoretical entities. Belief in theoretical entities can be grounded in well-tested localized causal claims about concrete physical processes, sometimes now called '*entity realism'*. Such causal claims provide the basis for partial realism and they are ineliminable from the practice of explanation and intervention in nature."

In other words, we can conclude from the prelude of her book that she asserts that there is a shift from traditional view, i.e. modern physics now seems to view that "explanation is a matter of constructing a model that may employ, but need not be consistent with, a theoretical framework, in which phenomenological laws that are true of the empirical case in question can be derived."

6. A few preliminary remarks on Penrose's Fashion, Faith, Fantasy

In preface of his book, Sir Roger Penrose discusses how fashion, faith and fantasy may have played their roles in the recent development of theoretical physics and cosmology. In particular he wrote as follows:[2]

> "In the first three chapters, I shall illustrate these three eponymous qualities with three very well-known theories, or families of theory. I have not chosen areas of relatively minor importance in physics, for I shall be concerned with what are big

fish indeed in the ocean of current activity in theoretical physics. In chapter 1, I have chosen to address the still highly fashionable string theory (or superstring theory, or its generalizations such as M-theory, or the currently most fashionable aspect of this general line of work, namely the scheme of things referred to as the ADS/CFT correspondence). The faith that I shall address in chapter 2 is an even bigger fish, namely that dogma that the procedures of quantum mechanics must be slavishly followed, no matter how large or massive are the physical elements to which it is being applied. And, in some respects, the topic of chapter 3 is the biggest fish of all, for we shall be concerned with the very origin of the universe that we know, where we shall catch a glimpse of some proposals of seeming sheer fantasy that have been put forward in order to address certain of the genuinely disturbing peculiarities that well-established observations of the very early stages of our entire universe have revealed."[2]

In other words, Sir Roger Penrose seems to argue that some of the most fashionable theories may gather followers simply because they are fashionable. And the proponents of Quantum Mechanics appear to follow strictly these procedures out of pure faith.

Penrose also suggest that there are certain experiments: "*Perhaps the results of such experiments may indeed undermine the unquestioning quantum-mechanical faith that seems to be so commonly held*."[2]

Apparently Penrose want to say that from time to time, these fashionable trends and also faith and also fantasy, need to be put under scrutiny.

Penrose also criticizes the faith in supra-dimensionality in string and superstring theories, as he noted: "*Such supra-dimensionality is a central contention of almost all of modern string theory and its major variants. My critical arguments are aimed at the current string-motivated belief that the dimensionality of physical space must be greater than the three that we directly experience*."[2]

7. Concluding Remarks

We admit that the general tone of this paper may sound a bit too critical to some readers. But what we want to achieve with this paper is quite simple: Allow us to remind all fellow physicists and cosmologists to become more aware of antirealism tendency, which may be caused by too much abstractions in developing physical theories. Yes, theoretical abstraction is necessary in almost every case, but it also healthy to keep in mind a good advice by Prof. Murray Gell-Mann. He often reminded younger physicists to keep a balance between Scylla and Charybdis, i.e. in developing theories one should maintain a healthy dose of realism beside (pure) abstractions.

We observe that many advanced physical theories which have been proposed during the last few decades have become increasingly too "*baroque*", i.e. they tend to use too many mathematical abstractions, while they seem to discard a healthy dose of realism.

Does it mean that an idealistic-Berkeley tendency of so many modern physical theories, such as string/superstring theories, M-theory et al., imply that they have no physical meaning? We do not pretend to know all the answers, nor we pretend to have mastery over these very difficult subjects.

All we can say is that perhaps now is the time to distinguish fashion, faith and fantasy in modern physics (as advocated by Sir Roger Penrose). And it will be quite healthy to remind ourselves from time to time the so-called *Ockham's razor* principle, which can be reformulated as follows: "the least complicated explanation (read: physical theories) may have a good chance to be the correct answer."

Acknowledgment

We dedicate this paper to Sir Roger Penrose, a prolific author and a very insightful mathematical-physicist.

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Borges and the Subjective-Idealism in Relativity Theory and Quantum Mechanics

Victor Christianto, Florentin Smarandache

Quote:
"We don't need no education,
We don't need no thought control..."
Pink Floyd - *Another Brick in the Wall*, part 2 (11)

ABSTRACT

This paper is intended to be a follow-up to our previous paper with title: "Reinterpreting Tlon, Uqbar, Orbis Tertius: On the antirealism tendency in modern physics." We will give more background for our propositions in the previous paper. Our message here is quite simple: allow us to remind fellow physicists and cosmologists to become more aware of Berkeley-idealism tendency, which can lead us to so many distractions instead of bringing us closer to the truth. We observe that much of the progress of modern physics in the last few decades only makes us as confused as before, but at a much higher level. In the last section, we will give some examples of how we can do something better than existing practice of physics in the past.

Keywords: realism-antirealism discourse, modern physics, theoretical physics, modern cosmology

1. Prologue

If we read Thomas Kuhn's *The Structure of Scientific Revolutions*(10), we can get a false impression that modern science is all abou cooking up our ideas to the point that they will be accepted by the consensus of respected scientists. Yes, Kuhn's ideas are closer to *constructivism*. He seems to give this message: all activities in science are aiming to construct a model or theory which can be accepted by as wide as possible scientific community. It is no more about finding the hidden truth of nature.

But if we recall the history of science, since Tycho Brahe, Copernicus, Galileo, Newton...they seem to care not about the consensus at the time. They just dig deeper with observations and also analytical work, and once they were convinced, they stood up because of their conscience.

Therefore, if we learn from such a long history of great scientists, all we can say is that science advances not because some people trying so hard to make revolutions (as suggested by Kuhn), but it advances because some careful scientists choose to stand up for their conscience, no matter what happens.

Yes, it is unfortunate that in most cases, a consensus of scientists can be so wrong. As one wisdom saying puts it: "*Follow a thousand flies, and you will end up eating shit*." Such a grave mistake in the past includes: epicycles in Ptolemian cosmology, which then it was replaced with heliocentric model of Copernicus. In modern physics, we find quite similar monsters as a result of widely accepted theories. Those monsters appear because we tend to call everything we don't know as dark or ghost: there are many ghosts in recent cosmology models, and there are dark matter and dark energy hypothesis too. All of them seem to indicate that we should begin to think in reflective mode, and find out where we have gone so wrong.

How can it be that such a consensus of scientists can lead to terrible errors? Perhaps we can recall the lyrics of Pink Floyd above, to remind us that in almost all levels of education, there is a kind of "thought control," and it is no more education. And it implies that there is probably a hidden force behind such a thought control.

The possibility of existence of such a hidden force who exerts control over the entire planet has never been discussed openly in philosophy books, nor in Kuhn's book. But

they are seemingly quite real.

These remarks put us into the context of this paper, i.e. Borges reminds us of a possibility that a bunch of academic luminaries tries to create their own world out of pure fantasy. They are called 'Orbis Tertius' society in Borges's short story. They start with Berkeley's idealism philosophy, but ultimately they want to reject the reality itself. Shall we call this move as "modern science"?

2. Why shall we start with Borges?

Some readers of our previous paper may wish to ask: Why shall we start with Borges? Or, is it possible to cure fantasy with fantasy?

Well, yes we start with Borges's fiction book, but only as per necessary in order to expose paradox and difficulties with the Berkelyan subjective idealism, which is often ignored in contemporary discussions by theoretical physicists. Who can realize our own "rotten-tomatoes" tendency to reject objective reality with our theories?

There is more to say about Borges, and his line of arguments using a method called "*reductio ad absurdum*." But we do not pretend to be well-versed with all related philosophical arguments.

Interested readers are advised to read Jon Stewart's study on that Borges's short story (1).

3. Einstein as a subjective mathematical idealist

For those who find it difficult to accept that Einstein was a subjective idealist, albeit he was quite a realist compared to other QM proponents, let us begin with his own words:

"If, then, it is true that the axiomatic basis of theoretical physics cannot be extracted from

experience but must be freely invented, can we ever hope to find the right way? I answer without hesitation that there is, in my opinion, a right way, and that we are capable of finding it. I hold it true that pure thought can grasp reality, as the ancients dreamed." (Albert Einstein, 1954) (13).

We wish to highlight the last phrase here: "pure thought can grasp reality, as the ancients dreamed." This phrase captures the essence of Einstein's idealism philosophy. He strived to prove that pure thought alone is sufficient, based on human imagination. That is why his other famous saying goes: "Imagination is more important than knowledge." What he meant with this saying seems to be obvious: he is very sure that human knowledge is a result of free invention out of imaginative minds. Einstein rejects the possibility that God is the ultimate source of true knowledge. Yes, Einstein wants to know how God thinks and created the world, but by his own imaginative way, not by following God.

We can recall a paper by Kurt Godel around 1949: "*Remark about relationship between Relativity theory and idealistic philosophy*."(28) This paper indicates that such an idealism debate in the context of Relativity Theory was not really new at all, at least to some philosophers at the time.

Therefore, we wish to emphasize here: while we admit that Einstein stood against *Quantum Solipsism* (their way of playing with reality), in the end of the day he was also one of key figures in opening up such an idealism position, i.e. his invention and adherence to Relativity Theory.

In this way, we can understand why there were no discussions anymore on the substratum structure of aether, after Relativity Theory was widely accepted by scientific community.

It was fortunate, that after some years from inventing General Relativity, apparently Hendrik A. Lorentz persuaded Einstein to admit the role of aether. And Einstein apparently listened to his senior's advise. He made public statement something like: "*General relativity without aether is unthinkable*." See his Leiden Lecture, 5 May 1920 (26).

After all, Einstein was a human being with the same confusions just like many of us, at a deeper level. He made his own mistakes, but he tried his best to repair his mistakes, just like in Leiden Lecture (Ether and Relativity), and also his strong refutation to probabilistic view of Quantum Mechanics (Copenhagen school).

4. Bohr and Heisenberg's subjective idealism attitude

As Henry Lindner puts it: *'Einstein was a subjectivist mathematical idealist. ...His physics consists of mathematical models of subjective experience - his sensations and measurement*."(6)

This approach can be observed clearly in his Special Relativity Theory paper, where he used the synchronization of clocks to prove his points. And in his General Relativity theory, he also began with a mental imagination, which he called "*gedanken-eksperiment*." In other words, in developing these two theories, Einstein relied on his mental models, instead of seeking deeper truth of electrodynamics or gravitation. Yes, history told us that his approach won the fame and glory at the time, and many people regard that his theory of gravitation supersede so many other gravitation theories, including by famous experimenters at the time such as Nikola Tesla (who proposed "Dynamical Gravitation Theory," where he unified electromagnetic theory and

gravitation).

Such an emphasis on measurement and the role of subjective sensation seems to inspire younger generation of physicists at the time, perhaps including Bohr and Heisenberg, who held the viewpoint something like: "it is not our task in physics to speak about the truth, but only what we can speak about experiments."

Again, to quote Henry Lindner: "*Quantum Mechanics - evolved from Einstein's Quantum Theory- is instead a probabilistic model of observer's experience of quantized light/matter interaction*."(6)

It is no surprise therefore that it leads to so many contradictions and confusions, one of paradoxes is known as Schrodinger's cat paradox.

5. Berkelian-idealism in Quantum Mechanics and its resulting contradictions

Let us begin with a quote from Einstein: "*Quantum mechanics is very impressive. But an inner voice tells me that it is not yet the real thing. The theory yields a lot, but it hardly brings us any closer to the secret of the Old One. In any case I am convinced that He doesn't play dice*." - Albert Einstein(12).

This view can be rephrased by quoting remarks by Marcoen Cabbolet: "*a form of Berkeley idealism is entailed in the Orthodox Quantum Mechanics."(*7) Cabbolet also concludes that it is therefore impossible to try to derive Quantum Mechanics in curved space, because curved space in General Relativity requires energy, i.e. they requires objective reality without observers.(7) If we follow his argument, it is clear that all attempts to find a correct theory of Quantum Gravity is just a matter of contradiction and confusions of their basic concepts.

Einstein took a position against other QM proponents, especially the Gottingen trio and also Niels Bohr in Copenhagen. It was unfortunate for him, that after a series of debates, Bohr won the heart of mainstream physicists at the time.

But Einstein remained in his standpoint, for example he expressed his view in a famous paper published at 1935 discussing incompleteness of QM.

Only a few physicists agreed with him to stand against the mainstream who held the Copenhagen interpretation. Notably, Louis de Broglie and also Erwin Schrodinger.

Later on, Schrodinger also made a public statement around 1955 while he was in Dublin Institute of Advanced Studies, something like this: "I reject the whole Quantum Mechanics." That statement must be heard because it was spoken by one of the inventors of QM theory. Schrodinger in his later life declared publicly that he refuted the wave-particle duality which was widely accepted at the time (until now), and instead he suggested a "*wave only*" view. See also (27).

6. What can we do now?

In the previous section, we have discussed that Einstein has subjective idealism tendency. But regarding his attitude to cosmology, we have great respect on his humble attitude toward God, as expressed in the following quote:

"*We are in the position of a little child entering a huge library filled with books in many different languages. The child knows someone must have written those books . It does not know how. It does not understand the languages in which they are written. The child dimly suspects a mysterious order in the arrangement of the books but doesn't know what*

it is. That, it seems to me, is the attitude of even the most intelligent human being toward God. We see a universe marvelously arranges and obeying certain laws, but only dimly understand these laws. Our limited minds cannot grasp the mysterious force that moves the constellations." - Albert Einstein(12).

Therefore, apparently we should accept that a humble attitude toward God is a good starting point in all kinds of theoretical physics, mathematical physics, particle physics and ultimately in developing cosmology models. Because we shall admit with modesty, that we do not know either the smallest entities of elementary particle world, nor we know the largest structure of void, filaments, and galaxy clusters and so on.

In almost every case, the entire modern physics rely too much on feeble guessing and rough experiments and also on observation apparatus with all their shortcomings and limitations. And we shall also admit that no one ever travels yet over the entire Milky Way galaxy, so we shall keep ourselves in humble admiration toward the God, the Ultimate Creator.

Beside all of these, of course we do not wish to ask all of you fellow physicists and cosmologists to return to the old days of physics in 18th or 19th centuries. Yes, we can mention a few physicists who admit that perhaps all the whole modern physics have gone astray:

a. Dirac tried to develop a classical model of electron, and published his paper around 1951, although his paper is less known compared to his famous equations in 1927. See (23).

b. Richard Feynman admitted that the complicated renormalization procedures in QED

are nothing more than "sweeping under the rug." (24) He seems to call for a better ways in dealing with infinities problem. That Feynman's remark perhaps can be understood better if we remember an old joke: "*The problem with computer programmers is that they often cheat in order to get results. The problem with mathematicians is that they often work with simple models in order to get results. But the problem with physicists is even worse: they often cheat with models in order to get results."* (We are aware that we should not include a joke in a scientific paper like this, and allow us to apologize for this. But we also know that sometimes a good joke can be much more insightful, than ten or twenty mediocre papers.)

c. Peter Woyt also laments about the recent trend of so many talented physicists to rely too much in celebrated superstring, string, or M-theory. Woyt is a Canadian mathematician who felts uneasy with such a marching crowd of string theorists, then he published his book with title: "*Not even wrong*."(25)

d. Sir Roger Penrose also reminds fellow theoretical physicists of possible distractions caused by following fashions, faith, or fantasy.

Now, if some readers want to ask us: so what do you advise? Again, it is not our aim to return the whole physical sciences to their 18th or 19th century phases. What we got in mind is perhaps it would be a good start to begin with a "*Retro-Classical physics."* What we mean with "retro" here, is to return to some old ideas, but reworking them in new approaches. Let us give a few examples of what we mean with Retro-Classical physics:

a. Timothy Boyer has published a series of papers where he proves that Planck blackbody

radiation law can be derived from (stochastic) electrodynamics theory. The message here is to rework Planck law from classical physics, but introduce a new stochastic assumption.

b. Pierre-Marie Robitaille has published a series of papers where he proved that Kirchoff is flawed. Does it mean that the Planck law is also flawed? It is a deep question which needs to be clarified.(14)

c. George Shpenkov and Leonid Kreidik have analyzed the errors in Schrodinger equations, then they worked out a new method to derive a periodic table of elements which is similar to Mendeleev table. Their novel method is based on working out a spherical solution of classical wave equation.

d. These authors have also published a few papers where we extended further Shpenkov's spherical classical wave equation to become a "*fractal vibrating string*" model. We admit that our model is in early phase, but this model offers the same conceptual simplicity of string theory, but without complicated problems caused by its supra-dimensionality (26 dimensions) that some variants of string theories suffer.

e. AdS/CFT. We heard that there is recent progress i.e. that some mathematicians have proved that there is theoretical correspondence between AdS/CFT and Navier-Stokes turbulence.(15) If we are not mistaken, this result brings us to possibility to consider cosmology starting from turbulence theory. And compare it with other papers discussing connection between Zeldovich approximation, Burgers' turbulence, and also adhesion model (Johan Hidding). See our paper (16).

f. Yang-Mills. If we recall that Yang-Mills theory is originally a classical field theory, then it seems possible to argue for a classical model of hadrons. A few years ago, one of

us tried to publish a short paper discussing possible extension of Classical Yang-Mills theory to fractal case.(17) We are aware that this is an unpopular approach, but again it seems worth to ask: is it possible to describe hadrons and leptons in terms of classical electrodynamics?

g. Isomorphism. For those readers who are adept in QM, allow us to say that there is known derivation of Maxwell-Dirac isomorphism. Check our recent paper in Prespacetime Journal, October 2017.(18)

h. LENR. Usually a nuclear fusion is explained in quantum mechanical way. But in a recent paper published in JCMNS, we argue that Coulomb barrier suppression can also be thought of from pure classical arguments. Check our paper (19).

i. Friedmann. In cosmology setting, it is known that Friedmann equations can be derived from Newtonian arguments, i.e. without complicated general relativity as starting point. While it is good to start afresh with such a Newtonian-Friedmann approach, we shall also keep in mind that Friedmann equations have limitation, i.e. they do not take into account the rotation in early universe. In a recent paper, we prove that if we consider vortical-rotation in early universe, then we will obtain an Ermakov-type equation. We already got numerical solution and plots of such an Ermakov-type equation in cosmological setting.(20)

j. 3D Navier-Stokes. After several futile attempts, this year we have found a numerical solution of 3D Navier-Stokes equations with the help of Wolfram Mathematica. We presented this result in a mathematical conference held in Bali, July 2017. Check also (21). This result rekindled our previous cosmology model based on Navier-Stokes

equations in Cantor sets.(22) Whether this model has theoretical correspondence with AdS/CFT theory (string-turbulence) or not, remains an open question.

7. Concluding Remarks

We have explained some arguments that both Relativity Theory and Quantum Mechanics have Berkelyan subjective idealim tendency. And the same tendency have plagued almost all aspects of modern physics as we know today. Other authors discussing this point of view have been cited too, although there are few who tried to defense quantum idealism, see Mikhail Popov (5) and also Erik Haynes (8).

In the last section we already outlined a few examples of recent development in theoretical physics and cosmology. We hope that those examples are sufficient as illustrations of what we meant with Retro-Classical Physics, and it seems that these are worth exploring further.

This is our message in the bottle, and we wish that some readers will find it in bing or google's shore. We do hope that we can write this message better, but unfortunately we are not professional philosophers by training. All we got are just our own mistakes in the past, and a little gut feeling that keeps telling us that we have done terrible mistakes. Yes, all of us have done our mistakes in our own ways. And we will take these mistakes to our graveyard, and even to eternity. Now is the time to repair those mistakes as far as we can.

We have heard about secret societies here and there, but it is not the purpose of this paper to disclose any secret society, let alone the Orbis Tertius. All we can say is that our feeble minds are so prone to fall into so many distractions, including but not limited to the subjective idealism. The history of Quantum Mechanics in the past taught us that

rejecting reality led us to nowhere. In fact, this antirealism tendency has led us to endless paradoxes and contradictions as we have observed in the last 90 years. Therefore, the best way to repair our grave mistakes is by returning back a healthy dose of realism into our theoretical models. And let the younger generations of physicists to learn to respect the realism. They should unlearn and relearn from so many mistakes in the past including our mistakes.

All in all, allow us to end this paper with a quote from Orwell: "*In a time of universal deceit - telling the truth is a revolutionary act.*" (George Orwell)

Acknowledgment

This paper is part of our investigation in the last eleven years, and perhaps earlier, on what are the true physical meaning of Schrodinger's wavefunction and also quantization rules in astrophysics. You can check our book in 2006 discussing Schrodinger equation from the perspective of multivalued logic. We admit that we have also followed fancy and fashion, and we made our mistakes too. We were so blind and got lost from reality.
Thanks God, He made us to see again with clarity. This paper is our act of repentance.
Our sincere thanks go to a number of fellow physicists and mathematicians who have shed light on our way through online and offline discussions, to mention some of them: Prof. RM Kiehn, Prof. Akira Kanda, Dr. George Shpenkov, Dr. Volodymyr Krasnoholovets, Dr. Mihai Prunescu, Dr. Carmen Wrede, Prof. Alexander Yefremov, Prof. V. Kassandrov, Prof. Yu P. Rybakov, Prof. Michael Fil'chenkov, Prof. Carlos Castro, Prof. Matti Pitkanen, Prof. Jose Tiago Oliveira, Dr. Ildus Nurgaliev, Prof. Thee Houw Liong, Prof. Liek Wilardjo, etc. And special thanks to younger physicists fellow: Yunita Umniyati (SGU) and Sergey Ershkov (MSU). Our deep gratitude also goes to a number of journal editors who allowed us to publish our works, to name a few: Roy Keys (Apeiron), AFLB editor, EJTP Editor, Dmitri Rabounski & Larissa Borissova (PiP), Dr. Huping Hu (Prespacetime J.), and Prof. J-P. Biberian (JCMNS). Nonetheless, the present paper is our sole responsibility.

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Thinking Out Loud on Early Creation through the Lens of Hermeneutics of Sherlock Holmes

(Towards a Model of Universe based on Turbulence-Generated Sound Theory)

Victor Christianto, Florentin Smarandache

Abstract

In recent years, apparently the Big Bang as described by the Lambda CDM-Standard Model Cosmology has become widely accepted by majority of physics and cosmology communities. Even some people have concluded that it has no serious alternative in horizon. Is that true? First, as we argued elsewhere, Big Bang story relies on singularity. In other words, when we are able to describe the observed data without invoking singularity, then Big Bang model is no longer required. Therefore, here we explore a few alternative stories other than Big Bang story, which most cosmologists believe it is the nearest to Biblical account of creation. We would argue that re-reading of Genesis 1:2 will lead us to another viable story, albeit the alternative has not been developed rigorously as LCDM theories. We also briefly discuss a fluid Maxwell equations of Prof. Tsutomu Kambe based on vortex sound theory.

Key Words: Maxwell electromagnetic theory, singularity-free cosmology model, vortex sound theory, early Universe, early creation, Genesis chapter 1, Spirit in Creation.

1. Introduction

One of the biggest mysteries in cosmogony and cosmology studies is perhaps: how to interpret properly Genesis chapter 1:2. Traditionally, philosophers proposed that God created the Universe out of nothingness (from reading "empty and formless" and "*bara*" words; this contention is called "*creation ex nihilo*."). Understandably, such a model can lead to various interpretations, including the notorious "cosmic egg" model as suggested by Georges Lemaitre, which then led to Big Bang model. Subsequently, many cosmologists accept it without asking, that Big Bang stands as the most faithful and nearest theory to Biblical account of creation. But we can ask: Is that cosmic egg model the true and faithful reading of Genesis 1:2?

In the subsequent chapter we will discuss how to answer this question by the lens of hermeneutics of Sherlock Holmes. This is a tool of mind which we think to be a better way compared to critical hermeneutics.

Now a word on the meaning of thinking out loud phrase. What we mean with this phrase is, according to a definition:

> **Thinking out loud** is the act of expressing in recoverable and external form new thoughts which you encourage your mind into exploring. Often these lead to new avenues of thought. When you **think out loud** you detect and explore ideas and concepts which are either unknown, or as yet unexplored.[1]

2. Several different interpretations of Genesis 1:2 and implications

Our discussion starts from the fundamental question that one of us (VC) has heard around three years ago. At the time, he (VC) has had a good time of conversation at Starbuck with a senior pastor who happens to be one of the most leading scholar from Jakarta Theology and Philosophy Seminary, i.e. Dr. Joas Adiprasetya (JA). VC tried to explain to him his idea on interpreting of Prolegomena of John Gospel as one of reliable biblical account of creation. In essence, one of us (VC) told JA that it appears possible to interpret the Logos as the Sacred Voice of God, then from voice we can infer sound wave, then from sound wave we can infer frequency. Therefore, we can infer that there should be primordial/relic sound wave which emerged at the earliest time of creation. [10-13] And Prof. Wayne Hu has written a paper about observation of such relic sound wave.

But JA asked him (VC): okay, then where was the role of Holy Spirit in that creation story based on John 1:1? I should admit that at the time I cannot come up with a convincing answer. I only said: “I do not think of that yet.”

And it took around three years before now we have been thinking this problem out loud, and here our answer can be summarized as follows: “The relic sound wave in early creation is a faithful interpretation of John 1:1, but we can come up with a more complete picture if we combine it with Gen. 1:2, that is the Holy Spirit came to hovering over the primordial fluid, then a kind of hurricane/storm started which created perfect medium where God spoke (Logos).”

[1] wiki.c2.com/?ThinkingOutLoud

Let us consider some biblical passages:

- What is *Hermeneutics of Sherlock Holmes*?
  One article suggests:[2]
  Holmes: "I have no data yet. It is a capital mistake to theorize before one has data. Insensibly one begins to twist facts to suit theories, instead of theories to suit facts."
  Far too often students of the Bible (and cosmology folks as well) twist verses to suit interpretations instead of formulating interpretations to suit what the verses say.
  Guide: Don't approach your passage assuming you know what it means. Rather, use the data in the passage – the words that are used and how they fit together – to point you toward the correct interpretation.

- A re-reading of Gen. 2:7 with Hermeneutics of Sherlock Holmes[3]

  If we glance at Gen. 2: 7, we see at a glance that man is made up of the dust of the ground (*adamah*) which is breathed by the breath of life by God (*nephesh*). Here we can ask, does this text really support the Cartesian dualism view?

  We do not think so, because the Hebrew concept of man and life is integral. The bottom line: it is not the spirit trapped in the body (Platonic), but the body is flowing in the ocean of spirit. [7]

  Let's look at three more texts:

a. Gen. 1: 2, "*The earth is without form and void, darkness over the deep, and the Spirit of God hovering over the waters*." Patterns such as Adam's creation can also be encountered in the creation story of the universe. Earth and the oceans already exist (similar to *adamah*), but still empty and formless. Then the Spirit of God hovered over it, in the original text "*ruach*" can be interpreted as a strong wind (storm). So we can imagine there is wind/hurricane, then in the storm that God said, and there was the creation of the universe. See also Amos Yong [6], also Hildebrandt [15]. From a scientific point of view, it is well known in aerodynamics that

[2] https://www.str.org/blog/learning-hermeneutics-from-holmes
[3] Check Eric McKiddie's article: https://www.thegospelcoalition.org/blogs/trevin-wax/10-tips-on-solving-mysterious-bible-passages-from-sherlock-holmes/

turbulence can cause sound (*turbulence-generated sound*). And primordial sound waves are indeed observed by astronomers.

b. Ps. 107: 25, "*He said, he raised up a storm that lifted up his waves*." The relation between the word (sound) and the storm (turbulence) is interactive. Which one can cause other. That is, God can speak and then storms, or the Spirit of God causes a storm. Then came the voice.

c. Ezekiel. 37: 7, "*Then I prophesy as I am commanded, and as soon as I prophesy, it sounds, indeed, a crackling sound, and the bones meet with one another."* In Ezekiel it appears that the story of the creation of Adam is repeated, that the Spirit of God is blowing (storm), then the sound of the dead bones arises.

The conclusion of the three verses above seems to be that man is made up of *adamah* which is animated by the breath or Spirit of God. He is not matter, more accurately referred to as spirit in matter. Like a popular song around 80s goes: "*We are spirits in the material world*."

3. A physical model of turbulence-generated sound for early Universe

Our discussion starts from the fundamental question: how can we include the rotation in early Universe model? After answering that question, we will discuss how “turbulence-generated sound” can be put into a mathematical model for the early Universe. We are aware that the notion of turbulence-generated sound is not new term at all especially in aerodynamics, but the term is rarely used in cosmology until now. We shall show that 3D Navier-Stokes will lead to non-linear acoustics models, which means that a turbulence/storm can generate sound wave.

a. How can we include rotation in early Universe model?

It has been known for long time that most of the existing cosmology models have singularity problem. Cosmological singularity has been a consequence of excessive symmetry of flow, such as “Hubble’s law”. More realistic one is suggested, based on Newtonian cosmology model but here we include the vortical-rotational effect of the whole Universe.

In this section, we will derive an Ermakov-type equation following Nurgaliev [8]. Then we will solve it numerically using Mathematica 11.

After he proceeds with some initial assumptions, Nurgaliev obtained a new simple local cosmological equation:[8][9]

$$\dot{H} + H^2 = \omega^2 + \frac{4\pi G}{3}\rho, \tag{1}$$

Where $\dot{H} = dH/dt$.

The angular momentum conservation law $\omega R^2 = \text{const} = K$ and the mass conservation law $(4\pi/3)\rho R^3 = \text{const} = M$ makes equation (5) solvable:[9]

$$\dot{\mathrm{H}} + \mathrm{H}^2 = \frac{K^2}{R^4} - \frac{\mathrm{GM}}{\mathrm{R}^3}, \tag{2}$$

Or

$$\ddot{R} = \frac{K^2}{R^3} - \frac{GM}{R^2}. \tag{3}$$

Equation (3) may be written as Ermakov-type nonlinear equation as follows;

$$\ddot{R} + \frac{GM}{R^2} = \frac{K^2}{R^3}. \tag{4}$$

Nurgaliev tried to integrate equation (3), but now we will solve the above equation with Mathematica 11. First, we will rewrite this equation by replacing GM=A, K^2=B, so we get:

$$\ddot{R} + \frac{A}{R^2} = \frac{B}{R^3}. \tag{5}$$

As with what Nurgaliev did in [8][9], we also tried different sets of A and B values, as follows:

a. A and B < 0

```
A=-10;
B=-10;
ODE=x''[t]+A/x[t]^2-B/x[t]^3==0;
sol=NDSolve[{ODE,x[0]==1,x'[0]==1},x[t],{t,-10,10}]
Plot[x[t]/.sol,{t,-10,10}]
```

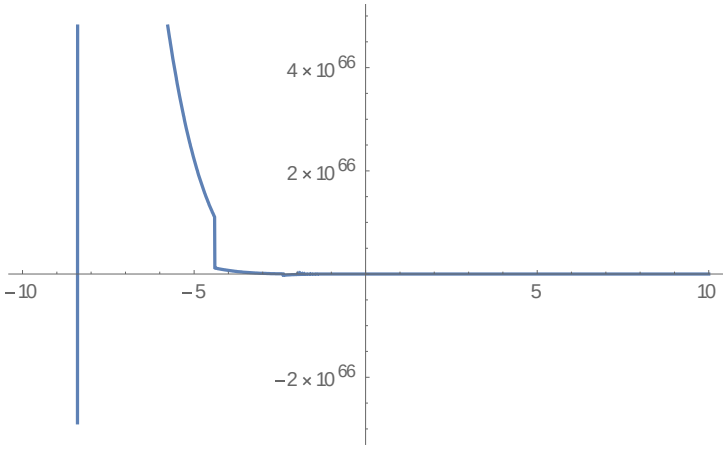


Figure 1. Plot of Ermakov-type solution for A=-10, B=-10

b. A > 0, B < 0

```
A=1;
B=-10;
ODE=x''[t]+A/x[t]^2-B/x[t]^3==0;
sol=NDSolve[{ODE,x[0]==1,x'[0]==1},x[t],{t,-10,10}]
Plot[x[t]/.sol,{t,-10,10}]
```

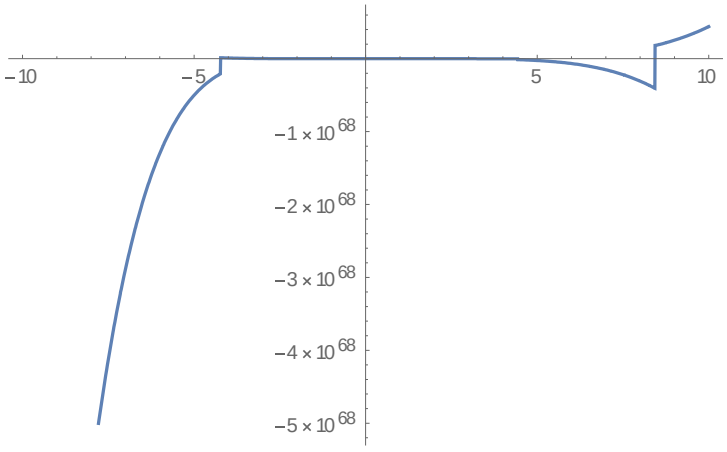


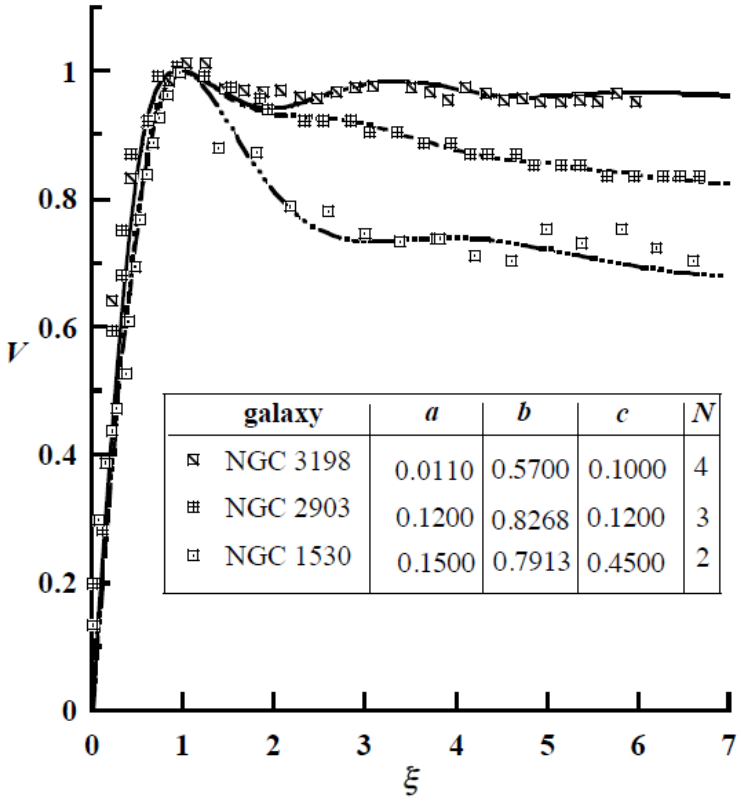
Figure 2. Plot of Ermakov-type solution for A=1, B=-10

From the above numerical experiments, we conclude that the evolution of the Universe depends on the constants involved, especially on the rotational-vortex structure of the Universe. This needs to be investigated in more detailed for sure.

One conclusion that we may derive especially from Figure 2, is that our computational simulation suggests that it is possible to consider that the Universe has existed for long time in prolonged stagnation period, then suddenly it burst out from *empty and formless* (Gen. 1:2), to take its current shape with accelerated expansion.

As an implication, we may arrive at a precise model of flattening velocity of galaxies without having to invoke *ad-hoc* assumptions such as dark matter.

Therefore, it is perhaps noteworthy to discuss briefly a simple model of galaxies based on a postulate of turbulence vortices which govern the galaxy dynamics. The result of Vatistas' model equation can yield prediction which is close to observation, as shown in the following diagram:[14]



galaxy	a	b	c	N
NGC 3198	0.0110	0.5700	0.1000	4
NGC 2903	0.1200	0.8268	0.1200	3
NGC 1530	0.1500	0.7913	0.4500	2

Figure 3. From Vatistas [14]

Therefore it appears possible to model galaxies without invoking numerous *ad hoc* assumptions such as *dark matter*, once we accept the existence of turbulent interstellar medium. The Vatistas model is also governed by Navier-Stokes equations, see for instance [14].

b. *How "turbulence-generated sound" can be put into a mathematical model for the early Universe*

We are aware that the notion of turbulence-generated sound is not new term at all especially in aerodynamics, but the term is rarely used in cosmology until now. We will consider some papers where it can be shown that 3D Navier-Stokes will lead to non-linear acoustics models, which means that a turbulence/storm can generate sound wave.
In this section we consider only two approaches:

- Shugaev-Cherkasov-Solenaya's model: They investigate acoustic radiation emitted by three-dimensional (3D) vortex rings in air on the basis of the unsteady Navier–Stokes equations. Power series expansions of the unknown functions with respect to the initial vorticity which is supposed to be small are used. In such a manner the system of the Navier–Stokes equations is reduced to a parabolic system with constant coefficients at high derivatives. [16]
- Rozanova-Pierrat's Kuznetsov equation: she analysed the existing derivation of the models of non-linear acoustics such as the Kuznetsov equation, the NPE equation and the KZK equation. The technique of introducing a corrector in the derivation ansatz allows to consider the solutions of these equations as approximations of the solution of the initial system (a compressible Navier-Stokes/Euler system). The direct derivation shows that the Kuznetzov equation is the first order approximation of the Navier-Stokes system, the KZK and NPE equations are the first order approximations of the Kuznetzov equation and the second order approximations of the Navier-Stokes system. [17]

4. Vortex-sound theory and fluidic Maxwell equations

There are a number of proposals to revise Maxwell equations. But few has considered a fresh starting point with regards to the (sub) structure of aether. It is very interesting to note that Prof. T. Kambe from University of Tokyo has made a connection between the equation of vortex-sound theory and its analogue fluid Maxwell equations. He wrote that it would be no exaggeration to say that any vortex motion excites *acoustic* waves. [2]

He considers the equation of vortex sound of the form: [2]

$$\frac{1}{c^2}\partial_t^2 p - \nabla^2 p = \rho_0 \nabla . L = \rho_0 div(\omega \times v) \tag{6}$$

He also wrote that dipolar emission by the vortex-body interaction is:[2]

$$p_F(x,t) = -\frac{P_0}{4\pi c}\dot{\Pi}_i(t-\frac{x}{c})\frac{x_c}{x^2} \tag{7}$$

Then he obtained an expression of fluid Maxwell equations as follows [2]:

$$\begin{aligned} &\nabla \cdot H = 0 \\ &\nabla \cdot E = q \\ &\nabla \times E + \partial_t H = 0 \\ &a_0^2 \nabla \times H - \partial_t E = J \end{aligned} \tag{8}$$

Where [2]:

a_0 denotes the sound speed, and

$$\begin{aligned} &q = -\partial_t (\nabla \cdot \upsilon) - \nabla \hbar, \\ &J = \partial_t^2 v + \nabla \partial_t h + a_o^2 \nabla \times (\nabla \times \upsilon) \end{aligned} \tag{9}$$

In our opinion, this new expression of fluid Maxwell equations suggests that there is a deep connection between vortex sound and electromagnetic fields.

However, it should be noted that the above expressions based on fluid dynamics need to be verified with experiments. We should note also that in (8) and (9), the speed of sound a_0 is analogous of the speed of light in Maxwell equations, whereas in equation (6), the speed of sound is designated "c" (as analogous to the light speed in EM wave equation).

As an added note, we can mention here that elsewhere Wang [5] was able to derive Coulomb law from the source-sink approach. We are wondering if it is also possible to re-derive Maxwell equations including displacement current from the same approach. If yes, then it may offer another fresh starting point to understand the physical meaning of displacement current.

5. Concluding remarks

In recent years, there is growing number of proposals to use a novel concept of singularity-free Cosmology models. It should be clear that if we are able to come up with such singularity-free models which agree well with observation data, then the Big Bang model is no longer required. Therefore, here we explore a few alternative stories other than Big Bang story, which most cosmologists believe it is the nearest to Biblical account of creation (as Fred Hoyle once remarked: the Big Bang is a fanatical religion).

We argue that a re-reading of Genesis 1:2 will lead us to another viable story, albeit the alternative has not been developed rigorously as LCDM theories.

It took around three years before now we have been thinking this problem out loud, and here our answer can be summarized as follows: "*The relic sound wave in early creation is a faithful interpretation of John 1:1, but we can come up with a more complete picture if we combine it with Gen. 1:2, that is the Holy Spirit came to hovering over the primordial fluid, then a kind of hurricane/storm started which created perfect medium where God spoke (Logos).*"

And one conclusion that we may derive especially from Figure 2, is that our computational simulation suggests that it is possible to consider that the Universe has existed for long time in prolonged stagnation period, then suddenly it burst out from *empty and formless (Gen. 1:2)*, to take its current shape which is accelerating. Such a possibility has never been considered before in cosmology literatures.

We also briefly discuss a plausible extension of Maxwell equations based on vortex sound theory of Prof. Tsutomu Kambe. It is our hope that our exploration will lead to nonlinear cosmology theories which are better in terms of observations, and also more faithful to Biblical account of creation.

Acknowledgment: The first author (VC) also would like to express his gratitude to Jesus Christ who always encouraged and empowered him in many occasions. He is the Good Shepherd. And special thanks to Dr. Joas Adiprasetya, Dr. Yonky Karman, and Dr. Wonsuk Ma for discussions on early creation of the Universe. We also thank to a number of professors in physics, including Prof. Liek Wilardjo and Prof. Thee Houw Liong. *Soli Deo Gloria!*

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A Newtonian-Vortex Cosmology Model from Solar System to Galaxy to Large Scale Structures: Navier-Stokes-Inspired Cosmography

Victor Christianto, Florentin Smarandache

ABSTRACT

Some years ago, Matt Visser asked the following interesting questions: How much of modern cosmology is really cosmography? How much of modern cosmology is independent of the Einstein equations? (Independent of the Friedmann equations?) These questions are becoming increasingly germane — as the models cosmologists use for the stress-energy content of the universe become increasingly baroque. Therefore, in this paper we will discuss a novel Newtonian cosmology model with vortex, which offers wide implications from solar system, galaxy modeling up to large scale structures of the Universe. The basic starting point is very simple: It has been known for long time that most of the existing cosmology models have singularity problem. Cosmological singularity has been a consequence of excessive symmetry of flow, such as "Hubble's law." More realistic one is suggested, based on Newtonian cosmology model but here we include the vortical-rotational effect of the whole Universe. We review an Ermakov-type equation obtained by Nurgaliev, and solve the equation numerically with Mathematica. A potential application is also considered, namely for understanding tornado dynamics using 3D Navier-Stokes equations. It is our hope that the new proposed method can be verified with observations, in order to open new possibilities of more realistic nonlinear cosmology models.

Keywords: Ermakov-type equation, nonlinear cosmology, Newtonian cosmology, vortex dynamics, turbulence, Navier-Stokes equations, spiral galaxy

1. Introduction

Some years ago, Matt Visser asked the following interesting questions: How much of modern cosmology is really cosmography? How much of modern cosmology is independent of the Einstein equations? (Independent of the Friedmann equations?) These

questions are becoming increasingly germane — as the models cosmologists use for the stress-energy content of the universe become increasingly *baroque*. [5]

In this regard, academician Isaak Khalatnikov mentioned at the 13th Marcel Grossman Conference[1], that Lev Landau suggesting that something is too symmetric in the models yielding singularities, and that this problem is one of the three most important problems of modern physics. The aim of this report is to show that singularities are, indeed, consequences of such an overly "symmetrical approach" in building non-robust (i.e. without structural stability) toy models with singularities. Such models typically apply a synchronous system of reference and "Hubble's law", neglecting not-to-be-averaged-out quadratic terms of perturbations (specifically, differentially rotational velocities, vortexes).[1]

Only by accounting the overlooked factors instead of Einstein's ad hoc introduction of a new entity, which was later declared by him as his "biggest blunder", can we correctly interpret accelerated cosmological expansion, as well as provide possibility of static solution. The common perception of the observed accelerated expansion is that there is need either in modifying the General Relativity or discover new particles with unusual properties. Interestingly enough, both ways are possible depending on what kind of system of reference and corresponding interpretation are chosen, a decision which is usually made depending on the level of *"geometrization*."[1]

Local rotations (vortices) play a role in radical stabilization of the cosmological singularity in the retrospective extrapolation, making possible a static or steady-state

[1] http://www.icra.it/mg/mg13/

(on the average) Universe or local region. Therefore Einstein could "permit" the galaxies to rotate instead of postulating a cosmological constant *ad hoc* in his general-relativistic consideration of a static Universe. Though, it does not necessarily mean that the cosmological constant is not necessary for other arguments.[2]

In this paper, more realistic one is suggested, based on Newtonian cosmology model but here we include the vortical-rotational effect of the whole Universe. We review an Ermakov-type equation obtained by Nurgaliev [1][2], and solve the equation numerically with Mathematica 11.

In this paper we will also discuss a novel Newtonian cosmology model with vortex, which offers wide implications from solar system, galaxy modeling up to large scale structures of the Universe.

It is our hope that the new proposed method can be verified with observation data.

2. A few historical notes

Since long time ago, there were numerous models of the Universe, dating back to Ptolemaic geocentric model, which was subsequently replaced by Nicolas Copernicus discovery. Copernicus model then was brought into fame after Isaac Newton published his book. But other than Newton, there was a model of Universe as a turbulent fluid (hurricane) brought by a French philosopher and mathematician, R. Descartes. But, this model was almost forgotten. Many physicists rejected Descartes' model because it stood against Newtonian model, but the truth is turbulence model can be expressed in Navier-Stokes equations, and Navier-Stokes equations can be considered as the rigorous formulation of Newtonian laws, especially for fluid dynamics. In other words, we can say

that Newtonian turbulence Universe is not in direct contradiction with Newtonian laws. Therefore, in this paper we submit wholeheartedly a proposal that the Universe can be modelled as Newtonian-Vortex based on 3D Navier-Stokes equations. We shall show some implications of this new model in the following sections.

3. Solar System model

In this section, we will review the work which was carried out by VC and FS during the past ten years or so. The basic assumption here is that the Solar System's planetary orbits are quantized. But how do their orbits behave? Do they follow Titius-Bode's law? Our answer can be summarized as follows:[6][7][8]

Navier-Stokes equations → superfluid quantized vortices → Bohr's quantization

Our predictive model based on that scheme has yielded some interesting results which may be comparable with the observed orbits of planetoids beyond Pluto, including what is dubbed as Sedna.[9] And it seems that the proposed model is slightly better compared to Nottale-Schumacher's gravitational Schrödinger model and also Titius-Bode's empirical law.

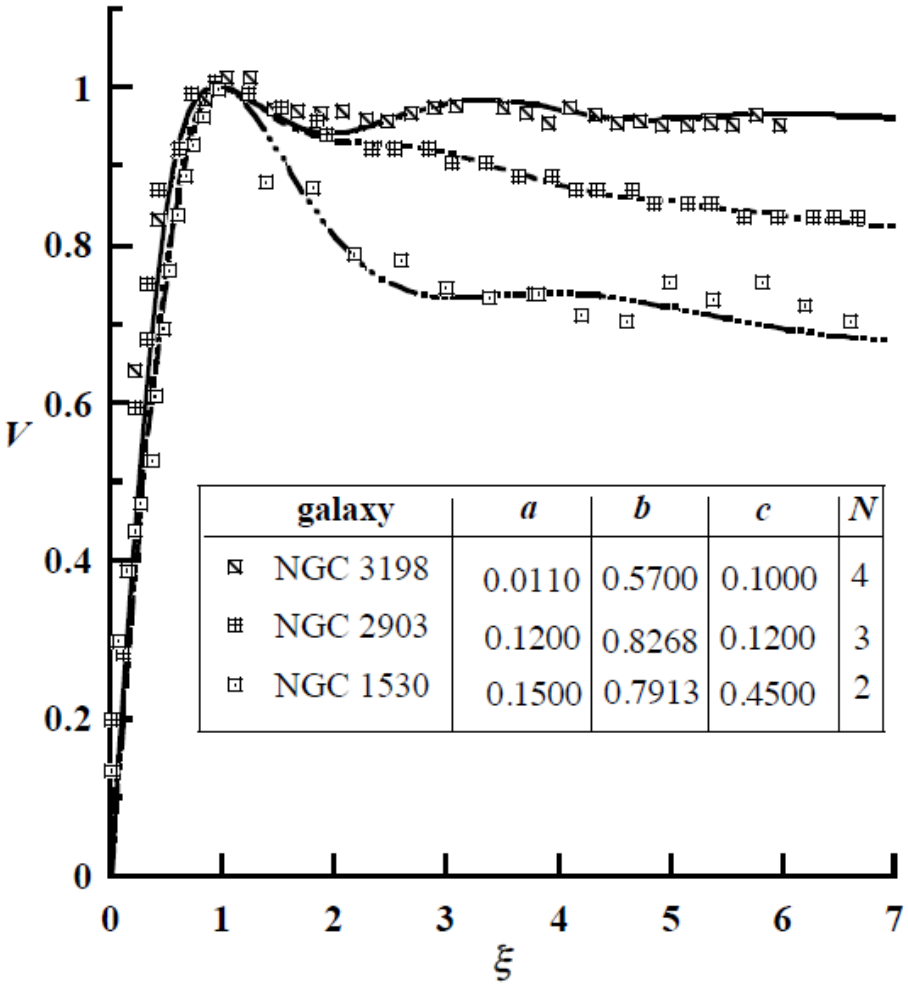
4. Spiral Galaxy model

In this section, we discuss a simple model of galaxies based on a postulate of turbulence vortices which govern the galaxy dynamics. Abstract of Vatistas' paper told clearly:[10]

Expanding our previous work on turbulent whirls [1] we have uncovered a similarity within the similarity shared by intense vortices. Using the new information we compress the tangential velocity profiles of a diverse set of vortices into one and thus identify those that belong to the same genus. Examining the Laser Doppler Anemometer (LDA) results of mechanically produced vortices and radar data of several tropical cyclones, we find that the uplift and flattening effect of tangential velocity is a consequence of turbulence. Reasoning by analogy we conclude that turbulence in the interstellar medium could indeed introduce a flattening effect in the galactic rotation curves.

The result of his model equation can yield prediction which is close to observation

(without invoking dark matter hypothesis), as shown in the following diagram:



galaxy	*a*	*b*	*c*	*N*
NGC 3198	0.0110	0.5700	0.1000	4
NGC 2903	0.1200	0.8268	0.1200	3
NGC 1530	0.1500	0.7913	0.4500	2

Diagram 1. From Vatistas [10]

Therefore it appears possible to model galaxies without invoking numerous *ad hoc* assumptions, once we accept the existence of turbulent interstellar medium. The model is also governed by Navier-Stokes equations.[10]

5. Deriving Ermakov-type equation for Newtonian Universe with vortex

It has been known for long time that most of the existing cosmology models have *singularity* problem. Cosmological singularity has been a consequence of excessive symmetry of flow, such as "Hubble's law". A more realistic one is suggested, based on Newtonian cosmology model but here we include the vortical-rotational effect of the whole Universe.

In this section, we will derive an Ermakov-type equation following Nurgaliev [1]. Then we will solve it numerically using Mathematica 11.

After he proceeds with some initial assumptions, Nurgaliev obtained a new simple local cosmological equation:[2]

$$\dot{H} + H^2 = \omega^2 + \frac{4\pi G}{3}\rho, \tag{1}$$

where $\dot{H} = dH/dt$. Here, H, G, ω and ρ stand for Hubble constant, Newtonian gravitational constant, angular speed, and density, respectively.

The angular momentum conservation law $\omega R^2 = \text{const} = K$ and the mass conservation law $(4\pi/3)\rho R^3 = \text{const} = M$ makes equation (1) solvable:[2]

$$\dot{H} + H^2 = \frac{K^2}{R^4} - \frac{GM}{R^3}, \tag{2}$$

or

$$\ddot{R} = \frac{K^2}{R^3} - \frac{GM}{R^2}. \tag{3}$$

Equation (3) may be written as Ermakov-type nonlinear equation as follows;

$$\ddot{R} + \frac{GM}{R^2} = \frac{K^2}{R^3}. \tag{4}$$

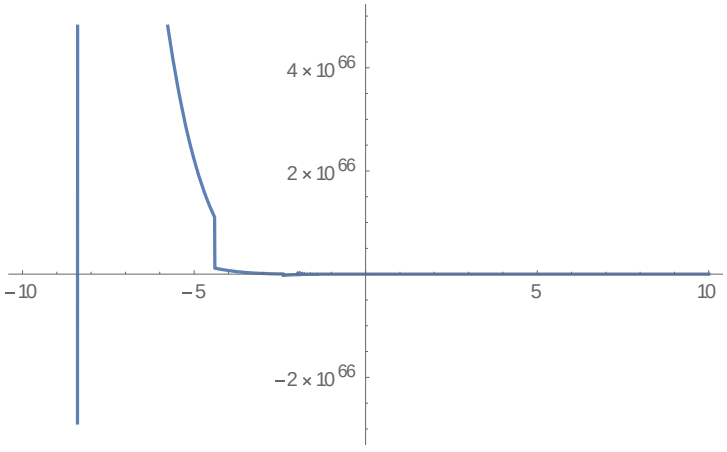
Nurgaliev tried to integrate equation (3), but now we will solve the above equation with Mathematica 11. First, we will rewrite this equation by replacing GM=A, K^2=B, so we get:

$$\ddot{R} + \frac{A}{R^2} = \frac{B}{R^3}. \tag{5}$$

As with what Nurgaliev did in [1][2], we also tried different sets of A and B values, as follows:

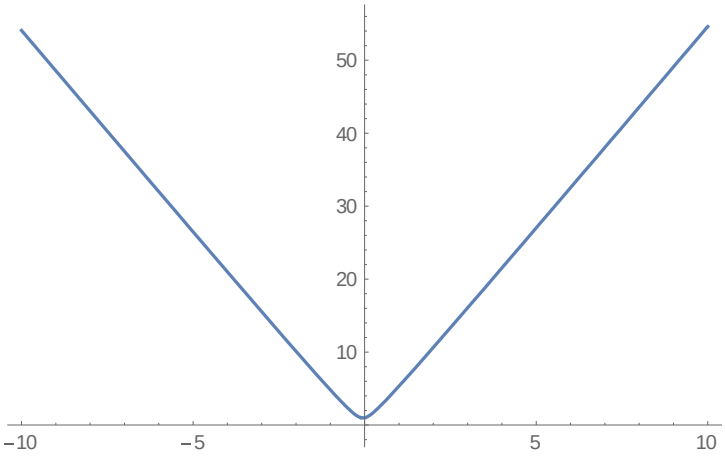
a. A and B < 0

```
A=-10;
B=-10;
ODE=x''[t]+A/x[t]^2-B/x[t]^3==0;
sol=NDSolve[{ODE,x[0]==1,x'[0]==1},x[t],{t,-10,10}]
Plot[x[t]/.sol,{t,-10,10}]
```



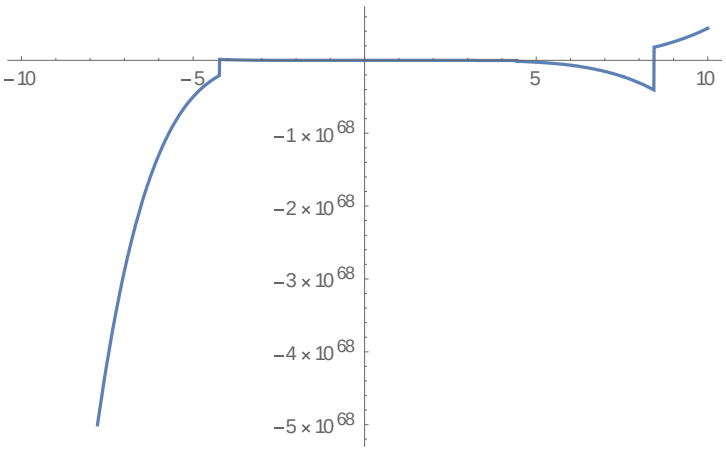
b. A < 0, B > 0

```
A=-10;
B=10;
ODE=x''[t]+A/x[t]^2-B/x[t]^3==0;
sol=NDSolve[{ODE,x[0]==1,x'[0]==1},x[t],{t,-10,10}]
Plot[x[t]/.sol,{t,-10,10}]
```



c. A > 0, B < 0

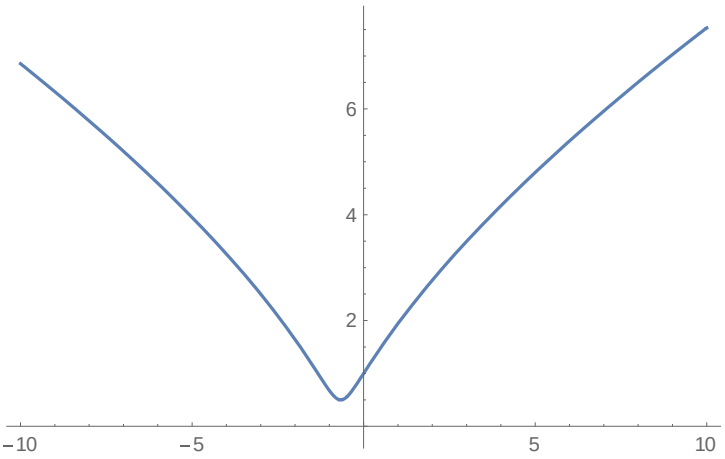
```
A=1;
B=-10;
ODE=x''[t]+A/x[t]^2-B/x[t]^3==0;
sol=NDSolve[{ODE,x[0]==1,x'[0]==1},x[t],{t,-10,10}]
Plot[x[t]/.sol,{t,-10,10}]
```



d. A >0, B > 0

```
A=1;
B=1;
ODE=x''[t]+A/x[t]^2-B/x[t]^3==0;
sol=NDSolve[{ODE,x[0]==1,x'[0]==1},x[t],{t,-10,10}]
```

```
Plot[x[t]/.sol,{t,-10,10}]
```



From the above numerical experiments, we conclude that the evolution of the Universe depends on the constants involved, especially on the rotational-vortex structure of the Universe. This needs to be investigated in more detailed for sure.

6. Engineering application: Hurricane dynamics and solution of 3D Navier-Stokes

Various methods to describe hurricane dynamics have been proposed in the literature, but most of them are based on 3D Navier-Stokes. Some existing models of tornado dynamics can be found in [11][12].

Now, we will discuss a simplified numerical solution of 3D Navier-Stokes equations based on Sergey Erhskov's papers [13][14].

In fluid mechanics, there is an essential deficiency of the analytical solutions of Navier–Stokes equations for 3D case of non-stationary flow. The Navier-Stokes system of equations for incompressible flow of Newtonian fluids should be presented in the Cartesian coordinates as below (under the proper initial conditions):[13]

$$\nabla.\vec{u} = 0, \tag{6}$$

$$\frac{\partial \vec{u}}{\partial t} + (\vec{u} \cdot \nabla)\vec{u} = -\frac{\nabla p}{\rho} + \nu \cdot \nabla^2 \vec{u} + \vec{F}, \tag{7}$$

where u is the flow velocity, a vector field; ρ is the fluid density, p is the pressure, v is the kinematic viscosity, and F represents external force (per unit mass of volume) acting on the fluid.[13]

In ref. [13], Ershkov explores the ansatz of derivation of non-stationary solution for the Navier–Stokes equations in the case of incompressible flow, which was suggested earlier. In general case, such a solution should be obtained from the mixed system of 2 coupled Riccati ordinary differential equations (in regard to the time-parameter t). But instead of solving the problem analytically, we will try to find a numerical solution.

The coupled Riccati ODEs read as follows:[13]

$$a' = \frac{w_y}{2} \cdot a^2 - (w_x \cdot b) \cdot a - \frac{w_y}{2}(b^2 - 1) + w_z \cdot b, \tag{8}$$

$$b' = -\frac{w_x}{2} \cdot b^2 - (w_y \cdot a) \cdot b - \frac{w_x}{2}(a^2 - 1) + w_z \cdot a. \tag{9}$$

First, equations (8) and (9) can be rewritten in the form as follows:

$$x(t)' = \frac{v}{2} \cdot x(t)^2 - (u \cdot y(t)) \cdot x(t) - \frac{v}{2}(y(t)^2 - 1) + w \cdot y(t), \tag{10}$$

$$y(t)' = -\frac{u}{2} \cdot y(t)^2 - (v \cdot x(t)) \cdot y(t) - \frac{u}{2}(x(t)^2 - 1) + w \cdot x(t). \tag{11}$$

Then we can put the above equations into Mathematica expression:[3]

```
v=1;
u=1;
w=1;
{xans6[t_], vans6[t_]}=
```

```
{x[t],y[t]}/.Flatten[NDSolve[{x'[t]==(v/2)*x[t]^2-(u*y[t])*x[t]-(v/2)*(y[t]^2-1)+w*y[t], y'[t]==-(u/2)*y[t]^2-(v*x[t])*y[t]-(u/2)*(x[t]^2-1)+w*x[t], x[0]==1,y[0]==0}, {x[t],y[t]},{t,0,10}]]

graphx6 = Plot[xans6[t],{t,0,10}, AxesLabel->{"t","x"},PlotStyle->Dashing[{0.02,0.02}]];
Show[graphx6,graphx6]
```

The result is as shown below:[3]

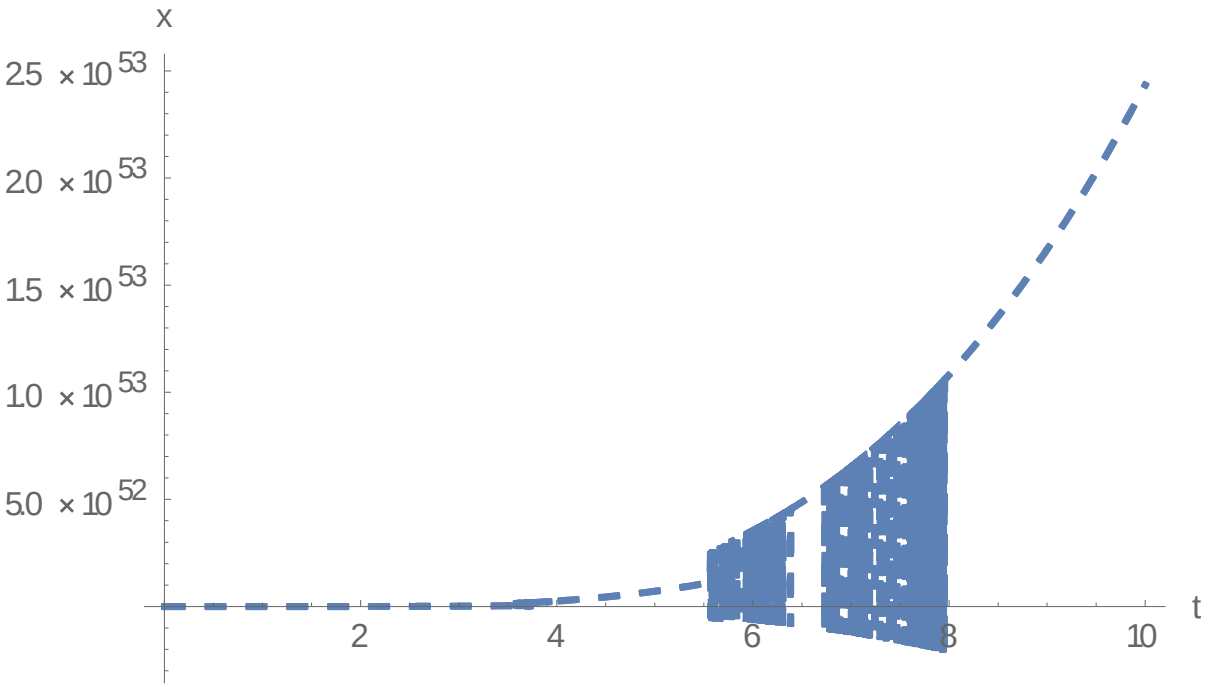


DIAGRAM 2. Graphical plot of solution for case v=u=w=1. See [3]

It is our hope that the above numerical solution of 3D Navier-Stokes equations can be found useful for engineering purposes, such as controlling large tornadoes which happen quite often in various regions each year.

7. Concluding Remarks

It has been known for long time that most of the existing cosmology models have singularity problem. Cosmological singularity has been a consequence of excessive

symmetry of flow, such as “Hubble’s law”. More realistic one is suggested, based on Newtonian cosmology model but here we include the vortical-rotational effect of the whole Universe. We discuss a plausible model for describing planetary quantization in Solar system and also flattening velocity observed in numerous galaxies. We also review a Riccati-type equation obtained by Nurgaliev, and solve the equation numerically with Mathematica 11.

We also discuss an engineering application of this model, i.e. how to solve 3D Navier-Stokes equations numerically. It is our hope that the above numerical solution of 3D Navier-Stokes equations can be found useful for engineering purposes, such as controlling large hurricanes which happen quite often in various regions each year.

The solutions obtained here opens up new ways to interpret existing solutions of known 3D Navier-Stokes problem in physics, astrophysics, cosmology and engineering fields, especially those associated with nonlinear hydrodynamics and turbulence modelling.

It is our hope that the new proposed Cosmology model with vortex can be verified with more extensive observation data.

Acknowledgment

The first author (VC) would like to express sincere gratitude to Sergey Ershkov from *Sternberg Astronomical Institute, M.V. Lomonosov’s Moscow State University.*

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Solving Numerically Ermakov-type Equation for Newtonian Cosmology Model with Vortex[1]

Victor Christianto, Florentin Smarandache

ABSTRACT

It has been known for long time that most of the existing cosmology models have singularity problem. Cosmological singularity has been a consequence of excessive symmetry of flow, such as "Hubble's law". More realistic one is suggested, based on Newtonian cosmology model but here we include the vertical-rotational effect of the whole Universe. We review a Riccati-type equation obtained by Nurgaliev, and solve the equation numerically with Mathematica. It is our hope that the new proposed method can be verified with observation data.

Keywords: Riccati-type equation, computational physics, nonlinear cosmology, Newtonian cosmology, vortex.

1. Introduction

It has been known for long time that most of the existing cosmology models have singularity problem. Cosmological singularity has been a consequence of excessive symmetry of flow, such as "Hubble's law."

In this regard, academician Isaak Khalatnikov mentioned at the 13th Marcel Grossman Conference (http://www.icra.it/mg/mg13/) Lev Landau suggesting that something is too symmetric in the models yielding singularities, and that this problem is one of the three most important problems of modern physics. The aim of this report is to show that

[1] This paper is dedicated for 72th anniversary of Indonesia's Independence Day, 17 august 2017.

singularities are, indeed, consequences of such an overly "symmetrical approach" in building non-robust (i.e. without structural stability) toy models with singularities. Such models typically apply a synchronous system of reference and "Hubble's law", neglecting not-to-be-averaged-out quadratic terms of perturbations (specifically, differentially rotational velocities, vortexes).[1]

Only by accounting the overlooked factors instead of Einstein's ad hoc introduction of a new entity, which was later declared by him as his "biggest blunder", can we correctly interpret accelerated cosmological expansion, as well as provide possibility of static solution. The common perception of the observed accelerated expansion is that there is need either in modifying the General Relativity or discover new particles with unusual properties. Interestingly enough, both ways are possible depending on what kind of system of reference and corresponding interpretation are chosen, a decision which is usually made depending on the level of "geometrization."[1]

Local rotations (vortices) play a role in radical stabilization of the cosmological singularity in the retrospective extrapolation, making possible a static or steady-state (on the average) Universe or local region. Therefore Einstein could "permit" the galaxies to rotate instead of postulating a cosmological constant ad hoc in his general-relativistic consideration of a static Universe. Though, it does not necessarily mean that the cosmological constant is not necessary for other arguments.[2]

In this paper, more realistic one is suggested, based on Newtonian cosmology model but here we include the vortical-rotational effect of the whole Universe.

We review a Riccati-type equation obtained by Nurgaliev, and solve the equation numerically with Mathematica. It is our hope that the new proposed method can be verified with observation data.

2. Deriving Ermakov-type equation for Newtonian Cosmology model

In this section, we will derive a Riccati-type equation following Nurgaliev [1]. Then we will solve it numerically using Mathematica 11.

After he proceeds with some initial assumptions, Nurgaliev obtained a new simple local cosmological equation:[2]

$$\dot{H} + H^2 = \omega^2 + \frac{4\pi G}{3}\rho, \tag{1}$$

Where $\dot{H} = dH/dt$.

The angular momentum conservation law $\omega R^2 = \text{const} = K$ and the mass conservation law $(4\pi/3)\rho R^3 = \text{const} = M$ makes equation (1) solvable:[2]

$$\dot{\mathrm{H}} + \mathrm{H}^2 = \frac{K^2}{R^4} - \frac{\mathrm{GM}}{\mathrm{R}^3}, \tag{2}$$

Or

$$\ddot{R} = \frac{K^2}{R^3} - \frac{GM}{R^2}. \tag{3}$$

Equation (3) may be written as Ermakov-type nonlinear equation as follows;

$$\ddot{R} + \frac{GM}{R^2} = \frac{K^2}{R^3}. \tag{4}$$

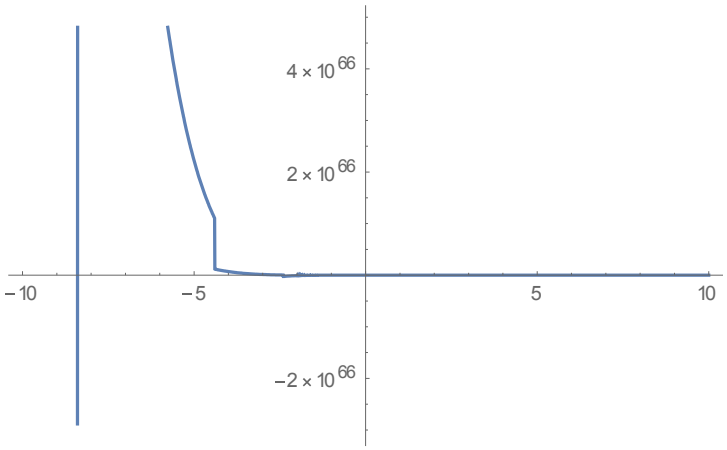
Nurgaliev tried to integrate equation (3), but now we will solve the above equation with Mathematica 11. First, we will rewrite this equation by replacing GM=A, K^2=B, so we get:

$$\ddot{R} + \frac{A}{R^2} = \frac{B}{R^3}. \tag{5}$$

As with what Nurgaliev did in [1][2], we also tried different sets of A and B values, as follows:

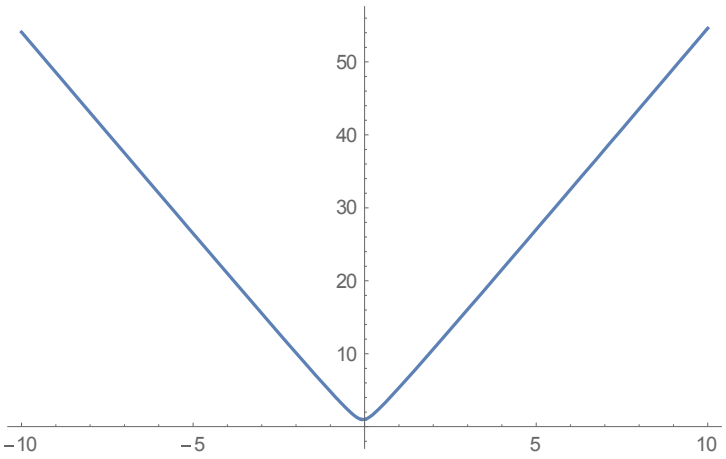
a. A and B < 0

```
A=-10;
B=-10;
ODE=x''[t]+A/x[t]^2-B/x[t]^3==0;
sol=NDSolve[{ODE,x[0]==1,x'[0]==1},x[t],{t,-10,10}]
Plot[x[t]/.sol,{t,-10,10}]
```



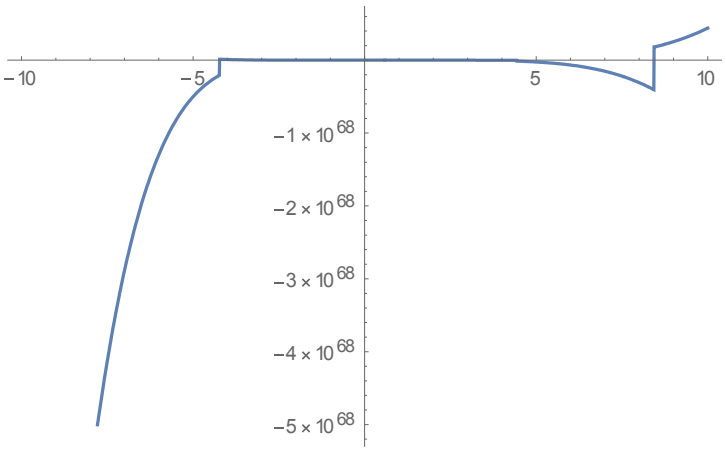
b. A < 0, B > 0

```
A=-10;
B=10;
ODE=x''[t]+A/x[t]^2-B/x[t]^3==0;
sol=NDSolve[{ODE,x[0]==1,x'[0]==1},x[t],{t,-10,10}]
Plot[x[t]/.sol,{t,-10,10}]
```



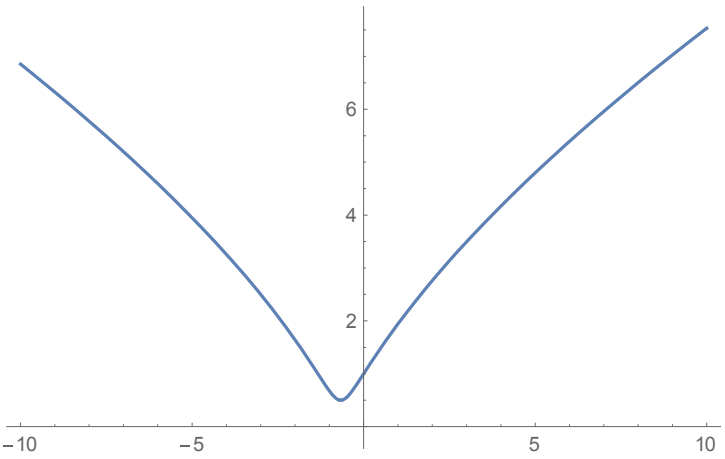
c. A > 0, B < 0

```
A=1;
B=-10;
ODE=x''[t]+A/x[t]^2-B/x[t]^3==0;
sol=NDSolve[{ODE,x[0]==1,x'[0]==1},x[t],{t,-10,10}]
Plot[x[t]/.sol,{t,-10,10}]
```



d. A >0, B > 0

```
A=1;
B=1;
ODE=x''[t]+A/x[t]^2-B/x[t]^3==0;
sol=NDSolve[{ODE,x[0]==1,x'[0]==1},x[t],{t,-10,10}]
Plot[x[t]/.sol,{t,-10,10}]
```



From the above numerical experiments, we conclude that the evolution of the Universe depends on the constants involved, especially on the rotational-vortex structure of the Universe. This needs to be investigated in more detailed for sure.

3. Concluding Remarks

It has been known for long time that most of the existing cosmology models have singularity problem. Cosmological singularity has been a consequence of excessive symmetry of flow, such as “Hubble’s law”. More realistic one is suggested, based on Newtonian cosmology model but here we include the vertical-rotational effect of the whole Universe. We review a Riccati-type equation obtained by Nurgaliev, and solve the equation numerically with Mathematica 11. It is our hope that the new proposed method can be verified with observation data.

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Exploration

From Zeldovich Approximation to Burgers' Equation: A Plausible Route to a Cellular Automata Adhesion Universe

Victor Christianto, Florentin Smarandache

ABSTRACT

Some years ago, Hidding *et al*. suggest that the emergence of an intricate and pervasive web-like structure of the Universe on Megaparsec scales can be approximated by a well-known equation from fluid mechanics, the Burgers' equation. The solution to this equation can be obtained from a geometrical formalism. The resulting Adhesion formalism provides deep insight into the dynamics and topology of the Cosmic Web. It uncovers a direct connection between the conditions in the very early Universe and the complex spatial patterns that emerged out of these under the influence of gravity. In the present paper, we describe a cellular automaton model of the Burgers' equation, which can be investigated via a fast computer simulation. In the end, this suggests a Cellular Automata Adhesion Model of the Universe.

Keywords: Discrete physics, cosmology, large scale structure, universe, numerical methods, cellular automata, Burgers equation, Zeldovich approximation.

1. Introduction

The Cosmic Web is the fundamental spatial organization of matter on scales of a few up to a hundred Megaparsecs. Galaxies and intergalactic gas matter exist in a wispy web-like arrangement of dense compact clusters, elongated filaments, and sheet-like walls, amidst large near-empty void regions. The filaments are the transport channels along which matter and galaxies flow into massive high-density clusters located at the nodes of the web. The web-like network is shaped by the tidal force field accompanying the inhomogeneous matter distribution [1].

Structure in the Universe has risen out of tiny primordial (Gaussian) density and velocity perturbations by means of gravitational instability. The large-scale anisotropic force field induces anisotropic gravitational collapse, resulting in the emergence of elongated or flattened matter configurations. The simplest model that describes the emergence of structure and complex patterns in the Universe is the Zeldovich Approximation (ZA) [1]. It is our hope that the new approach of the CA Adhesion model of the Universe can be verified either with lab experiments, computer simulation, or by large-scale astronomy observation data.

2. From Zeldovich Approximation to Burgers' Equation to the Cellular Automaton model

In this section, we will outline a route from ZA to Burgers' equation and then to the CA model. The simplest model that describes the emergence of structure and complex patterns in the Universe is the Zeldovich Approximation (ZA). In essence, it describes a ballistic flow, driven by a constant (gravitational) potential. The resulting Eulerian position x(t) at some cosmic epoch t is specified by the expression [1]:

$$x(t) = q + D(t)u_o(q), \tag{1}$$

where q is the initial "Lagrangian" position of a particle, D(t) the time-dependent structure growth factor and

$$u_0 = -\nabla_q \Phi_0 \tag{2}$$

its velocity. The nature of this approximation may be appreciated by the corresponding source-free equation of motion,

$$\frac{\partial u}{\partial D} + (u \cdot \nabla_x)u = 0. \tag{3}$$

The use of ZA is ubiquitous in cosmology. One major application is its key role in setting up initial conditions in cosmological N-body simulations. Of importance here is its nonlinear extension in terms of the *Adhesion Model* [1].

The ZA breaks down as soon as self-gravity of the forming structures becomes important. To 'simulate' the effects of self-gravity, Gurbatov *et al*. included an artificial viscosity. This results in the Burgers' equation as follows [1]:

$$\frac{\partial u}{\partial D} + (u \cdot \nabla_x)u = \nu.\nabla_x^2 u, \tag{4}$$

a well-known PDE from fluid mechanics. This equation has an exact analytical solution, which in the limit of $\nu \to 0$, the solution is [1]:

$$\phi(x, D) = \max_q \left[\Phi_0(q) - \frac{(x-q)^2}{2D} \right]. \tag{5}$$

This leads to a geometric interpretation of the Adhesion Model. The solution follows from the evaluation of the convex hull of the velocity potential modified by a quadratic term. We found that the solution can also be found by computing the weighted Voronoi diagram of a mesh weighted

with the velocity potential. For more detailed discussion on the Adhesion Model of the Universe, see for example [4].
Now, let us consider another route to solve Burgers' equation: (a) by numerical computation with *Mathematica*, see [3]; and (b) by virtue of the CA approach. Let us skip route (a) and discuss a lesser known approach of cellular automata.

We start with the Burgers' equation with Gaussian white noise that can be rewritten as follows [2]:

$$\frac{\partial u}{\partial t} + \xi = 2u\frac{\partial u}{\partial x} + \frac{\partial^2 u}{\partial x^2} + \eta. \tag{6}$$

By introducing new variables and straightforward calculations afterwards, we have the automata rule [2]:

$$\begin{aligned} \phi_i^{t+1} &= \phi_{i-1}^t + \max[0, \phi_i^t - A, \phi_i^t + \phi_{i+1}^t - B, \Psi_i^t - \phi_{i-1}^t] \\ &- \max[0, \phi_{i-1}^t - A, \phi_{i-1}^t + \phi_i^t - B, \Phi_i^t + \phi_{i-1}^t] \end{aligned} \tag{7}$$

In other words, in this section we give an outline of a plausible route from ZA to Burgers' equation and then to the CA model, which suggests that it appears possible – at least in theory – to consider a nonlinear cosmology based on the CA Adhesion model.

3. Concluding Remarks

The use of ZA is ubiquitous in cosmology. One major application is its key role in setting up initial conditions in cosmological N-body simulations. Of importance here is its nonlinear extension in terms of the *Adhesion Model*. In this paper, we give an outline of a plausible route from ZA to Burgers' equation then to the CA model, which suggests that it appears theoretically possible to consider a nonlinear cosmology based on CA Adhesion model.

This paper is part of our theoretical investigation of plausible nonlinear cosmology models beyond Navier-Stokes-inspired approaches.

It is our hope that the proposed approach can be verified with a more extensive computer simulation and (astronomy) observation data.

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A Theo-Cymatic reading of Prolegomena of St. John's Gospel: And Implications for Cosmology etc.

Victor Christianto

Abstract

The science of cymatics, the study of visible sound, is beginning to yield clues to one of the most challenging questions in science: what triggered the creation of life on earth? The hypothetical model we have developed was inspired by ancient traditions and demonstrates that sound and cymatic forces could have worked together to become the dynamic force that created the first stirrings of life and also the Universe.

Guiding Text: John 1:1-5

1. In the beginning was the Word, and the Word was with God, and the Word was God.

2 The same was in the beginning with God.

3 All things were made by him; and without him was not any thing made that was made.

4 In him was life; and the life was the light of men.

5 And the light shineth in darkness; and the darkness comprehended it not.

Prologue

Spiritual traditions from many cultures speak of sound as having been responsible for the creation of life.

For instance, the Celts of old believed that the world was upheld and sustained by a single all-embracing melody: "Oran Môr," they called it, the Great Music, and all creation was part of it. Perhaps this is why Celtic music possesses the power to move us in unexpected ways - it touches

that place deep in our hearts where legends still live, and we hear again the strains of the Ancient Song. (Stephen R. Lawhead, 1996) See Ref. (2).

The words of St.John's gospel are also a good example:(3)

"In the beginning the Word already existed. The Word was with God, and the Word was God."

['Word' meaning 'sound']

The science of cymatics, the study of visible sound, is beginning to yield clues to one of the most challenging questions in science: what triggered the creation of life on earth? The hypothetical model we have developed was inspired by ancient traditions and demonstrates that sound and cymatic forces could have worked together to become the dynamic force that created the first stirrings of life and also the Universe.(3)

The proposed model discussed herein may resonate with the concept of harmony of the spheres as outlined in Johannes Kepler's first monumental work: "*Mysterium Cosmographicum*."(22)

A theo-cymatic interpretation of John 1:1

Cosmic Christology is a basic Christian doctrine that was often debated during the past 40 years. Cosmic Christology is deeply related with the Cosmic Christ who is the universal but inclusive Savior. (6)

The biblical teaching on Cosmic Christology was a legacy of the faith of the Early Church, and this teaching was told in Jesus hymn in the Johannine prologue and the prologue of St. Paul's letter to Colossians (John 1:1-18; Col. 1:15-20), see also Christ hymn in letter to Philippians 2:6-11.

Besides, there are also some texts which were often cited from the Old Testament; these texts indicate the personified Wisdom of God, who acts as the agent of creation. And this character was then used for Jesus Christ. (Proverbs 8:22-31; Wisdom of Solomon 8:4-6; Sirakh 1:4-9). There are also extra-biblical sources which can be referred to, such as "the Son of God" text of Qumran (Bereh di El, 4Q246). Such a text indicates that there was a kind of messianic hope of Essene people, and that hope was very close to the faith of Early Church toward Jesus Christ.

Several implications

That is why, one of my focus of research in the past 3 years until now was to find implications of Cosmic Christology in the context of physics and cosmology. That idea was motivated by the fact that there has been a serious tension between science and theology, after they were separated especially since Galileo Galilei was put into isolation by the Church. One of the books which has inspired me was by Tollefsen which discusses Christocentric Cosmology. See Thorstein Theodor Tollefsen: The Christocentric Cosmology of St. Maximus the Confessor (8).
My investigation has led to several hypotheses, five of them will be discussed shortly below:

(a) Jesus Christ is the Word of God, and He is the agent of God during the creation of the Universe. Because word means voice, and voice means sound, and sound means wave and frequency, then this thought led us to a hypothesis of the existence of primordial sound in the early time of creation (6). It is known by many cosmologists that there is abundance of relic cosmic sound wave from early epoch of creation. Perhaps such a primordial sound will be verified later by Cosmic microwave background radiation observation (CMBR). See for example (11).

(b) another thought is that (electromagnetic) wave and frequency are very influential to begin each life of creatures. It appears that such a hypothesis was supported by experiments carried out by Prof. Luc Montagnier et al on the wave nature of DNA; (13)(14).

(c) that tought on the wave nature of the Universe also led to a wave model of superconductor electrodynamics. In physics, conductor is matter which can transmit electric current, while superconductor is matter which can transmit electric current at zero resistance. My hypothesis on superconductor electrodynamics has been discussed in a paper published last year in IJET (10);

(d) frequency may also be used to develop a novel approach of cancer therapy (12).

(e) the light particle which was dubbed as photon has also the wave character. The photon wave can be loaded with information (bits), and according to some experiments on lab, such a method is potentially capable to improve the wireless internet capacity significantly, possibly at the order of 100-160 Gigabits per second. But this method needs to be developed further before it can be used as practical technology (15).

Concluding remarks

For further discussion, there is my recent book discussing a new cosmology model starting from a fractal vibrating string. (fractal vibrating string is fractal generalization of classical wave equation of sound). See (5).

The basic idea of this book is that it is possible to develop a new cosmology model inspired by Cosmic Christology. In other words, Christology is not a separate matter from science. From Christology as starting point, I began to develop various approaches based on wave physics, which I call: “fractal vibrating string.” Through this new cosmology model, I wish to offer a new path for dialogue between science and theology. Moreover, it offers a new and fresh approach to understand the bible in this modern time.

I also wish that I already presented my interpretation on Cosmic Christology based on the Johannine prologue, albeit not a complete one.

As a last remark, allow me to cite Psalm 19:1-3

1 "The heavens declare the glory of God; and the firmament sheweth his handywork.
2 Day unto day uttereth speech, and night unto night sheweth knowledge.
3 There is no speech nor language, where their voice is not heard. "(KJV)

May God be with you. *Soli Deo Gloria.*

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APPENDIX: A reflection of my journey over the past 20 years or so

Early days

I should admit here: that for some time in the past I have fallen to become such an idol

worshipper, especially in the period between 1997-2014. In 1996 I bought a book edited by Wojciech Zurek with title "Complexity, Entropy and the Physics of Information", published by Santa Fe Institute (Addison-Wesley, 1991). Since then, practically I was very enthusiastic on various interpretations of Quantum Mechanics. I then read several books on QM, including Alistair Rae's book. (15)

After around six years of independent study in wave mechanics, I decided that time has come to put my ideas in writing. In 2002 I submitted my first paper to Apeiron editor, but it was rejected soon. I forgot about the title. Then I put more effort to write a quite speculative paper, based on hypothesis that the solar system can be modelled as quantized vortices of superfluid helium. Using this new model which is essentially a Bohr model of atom applied to solar system, I made a desperate effort in the form of two things: (a) predicting a brown dwarf companion of the Sun with negative mass about equal with the Sun, (b) predicting three undiscovered planets in the outer orbits of the Solar system, beyond Pluto orbit (at the time of writing, no such planet was discovered by astronomers).

The reviewer of this paper was Prof. Robert Kiehn, and he was so kind to read my often confusing English expressions. I am indebted to him, because he was the first person who gave encouragement to my endeavor. After editing and rewriting this 43-pages paper for about one year and a half, finally the editor of Apeiron received my paper for publication. It was published in January 2004 (12).

To my surprise, around four months later I read an online news telling that a new planetoid beyond pluto was found, dubbed as Sedna. It was discovered by Michael Brown and his team of astronomers from Caltech. I then rushed to my old desktop pc to calculate its orbit and to compare it with my prediction back in 2002, and I found that Sedna's orbit is very close to my

prediction. Then I quickly wrote a paper discussing Sedna finding. This paper was received and published in Apeiron's July 2004 edition (13). See also an updated paper (14).

After what may be called a beginner's luck, I felt so motivated to continue my investigation on quantum mechanics, especially in deterministic QM with quantum vortice interpretation of wavefunction. These early period investigations have been documented in several books and papers***, including in Annales de la Fondation Louis de Broglie, 2006 (11).

Over those early years, I have learned from many interesting persons, including but not limited to Prof. Brian Josephson, Prof. Carlos Castro, Prof. Mat Pitkanen, Dr. Jack Sarfatti, Prof. Florentin Smarandache, Dmitri Rabounski etc. Almost all those people whom I knew via email conversations have one similarity, i.e. they were dissidents and were completely or partially blacklisted by www.arxiv.org,**** the online "temple" of mainstream physics, especially it is a place to worship high energy physics.**

In 2005, through email discussion, Prof. Brian Josephson (Noble laureate) suggested a name for our new alternative preprint server, that is www.sciprint.org. Since may 2005, then I became administrator of www.sciprint.org. I administered sciprint.org beside my daily profession until 2009 when for some reasons, my admin password was compromised, so I cannot continue administering that preprint server.

Fortunately, a colleague told me that a new preprint service has just come to appear, i.e. www.vixra.org, administered by Dr. Phil Gibbs ("vixra" is "arxiv" read backward). Then I asked him whether he would like to host our files in sciprint.org. After he accepted, then I tried my best to recover and send these files of almost 300MB to a friend in Germany, who then downloaded the files and burned those files into a disc. Thereafter he mailed the disc to Phil Gibbs in England. That is why until now you will find some papers in vixra.org with small notes that they

were recovered from www.sciprint.org.

(Note: If you want to verify this story of sciprint.org, you can contact Prof. Carlos Castro Perelman at perelmanc@hotmail.com, or Prof. Florentin Smarandache at fsmarandache@gmail.com)***

Moment of enlightenment

Around October 2009, in a prayer Jesus Christ called me to become His servant, and one of His instruction was I must return to my hometown. Then I went to my hometown in East Java, and began to serve in a local church where I grew up with. In 2011, I decided to equip myself with a formal education in theology. In those years I was quite busy with other things, so practically I left behind science stuff. I guess I should leave science behind me, that at a point I did not answer back when Prof. Florentin Smarandache called me in phone.

But gradually I found a balance in my life, so I tried to write some papers again since. I also compiled a few books on astrophysics with Prof. Florentin Smarandache.

Then I came to a point that my theology education was almost completed, so I can return to former fields of interest: cosmology and astrophysics.

Around May 2014, when I was travelling in a bus, then a thought came to me: what is the power behind a worship song? It came to me that it was frequency which has power to turn even the walls of Jericho to ruining. This was my first moment of enlightenment.

The second moment came around that time (may-june), when I found some papers by Dr. George Shpenkov (http://shpenkov.janmax.com), who was able to show convincingly that there are many errors with Schrodinger equation. So I concluded that it was not only the mistake of

Max Born who introduced probability interpretation of quantum mechanics, but Schrodinger himself made serious errors too in deriving his then famous equation.

Then I wrote a paper reviewing Schrodinger equation and classical wave equation, that paper was published in Prespacetime Journal, july 2014 (16). Although I agree with Dr. Shpenkov that classical wave equation is better than the Schrodinger equation, it does not mean that I agree with his dialectic philosophy.

Gradually, I came to think that frequency and wave were also important at the time of creation, therefore I began my study into an interpretation of Cosmic Christology through the Johannine prologue (John 1:1-18).

I hope that I have told my story with clarity. It should be clear that I began as a dissident in the same temple of Quantum Mechanics, but gradually I turned out to refuse to worship those "gods" of mainstream physics. Instead, I decided to develop a new path where science and theology can meet.

Hopefully the above story will inspire many more young students and graduate students alike to return to God, instead of wandering around from one temple to another, only to find many kinds of deception over and over again.

Postscript:

*url: http://researchgate.net/profile/Victor_Christianto

**I sincerely do hope that someday arxiv.org administrators will change their draconian policy and cumbersome submitting procedures. Fortunately there is news that they are now conducting an online survey (dated 6th april 2016), so I hope that many dissidents like me can submit papers without being rejected by arxiv.org.

***Check our books in pdf version at the homepage of Prof. Florentin Smarandache,

http://fs.gallup.unm.edu/FlorentinSmarandache.htm

****Check http://www.archivefreedom.org, see also Against the Tide book at

http://vixra.org/abs/0909.0002

From Acoustic Analog of Space, Cancer Therapy, to Acoustic Sachs-Wolfe Theorem: *A Model of the Universe as a Guitar*

Victor Christianto, Florentin Smarandache, Yunita Umniyati

ABSTRACT

It has been known for long time that the cosmic sound wave was there since the early epoch of the Universe. Signatures of its existence is abound. However, such an acoustic model of cosmology is rarely developed fully into a complete framework from the notion of space, cancer therapy up to the sky. This paper may be the first attempt towards such a complete description of the Universe based on classical wave equation of sound. It is argued that one can arrived a consistent description of space, elementary particles, Sachs-Wolfe acoustic theorem, up to a novel approach for cancer therapy, starting from this simple classical wave equation of sound. We also discuss a plausible extension of Acoustic Sachs-Wolfe theorem based on its analogue with Klein-Gordon equation to become Acoustic Sachs-Wolfe-Christianto-Smarandache-Umniyati (ASWoCSU) equation. It is our hope that the new proposed equation can be verified with observation data. But we admit that our model is still in its infancy, more researches are needed to fill all the missing details.

Keywords: acoustic metric, acoustic analogue of space, acoustic cosmology, Sachs-Wolfe theorem, cancer therapy with frequency.

Contents:

1. Introduction
2. Acoustic Analogue of Space
3. Reinterpreting Schrodinger equation
4. Derivation of Klein-Gordon equation from the Classical Wave equation
5. Acoustic Sachs-Wolfe theorem and its plausible extension
6. A novel method of cancer therapy with frequency
7. Discussion and Concluding Remarks

1. Introduction

In one of his remarkable papers, the late C.K. Thornhill wrote as follows: [1]

> "Relativists and cosmologists regularly refer to space-time without specifying precisely what they mean by this term. Here the two different forms of spacetime, real and imaginary, are introduced and contrasted. It is shown that, in real space-time (x, y, z, ct), Maxwell's equations have the same wave surfaces as those for sound waves in any uniform fluid at rest, and thus that Maxwell's equations are not general and invariant but, like the standard wave equation, only hold in one unique frame of reference. In other words, Maxwell's equations only apply to electromagnetic waves in a uniform ether at rest. But both Maxwell's equations and the standard wave equation, and their identical wave surfaces, transform quite properly, by Galilean transformation, into a general invariant form which applies to waves in any uniform medium moving at any constant velocity relative to the reference-frame. It was the mistaken idea, that Maxwell's equations and the standard wave equation should be invariant, which led, by a mathematical freak, to the Lorentz transform (which demands the non-ether concept and a universally constant wave-speed) and to special relativity. The mistake was further compounded by misinterpreting the differential equation for the wave hypercone through any point as the quadratic differential form of a Riemannian metric in imaginary space-time (x, y, z, ict). Further complications ensued when this imaginary space-time was generalised to encompass gravitation in general relativity."

In a sense, we also learn about the significance of Newtonian concept of space and time from Prof. Akira Kanda, logician mathematician. Therefore, in this paper we will start with a simple premise that the space itself has an acoustic origin, and it relates to Maxwell equations. Maxwell equations can be expressed in terms of vortex sound equation. So it will indicate a new interpretation of aether in acoustic terminology.

It is argued that one can arrive at a consistent description of space, elementary particles, Sachs-Wolfe acoustic theorem, up to a novel approach for cancer therapy, starting from this simple classical wave equation of sound. We also discuss a plausible extension of Acoustic Sachs-Wolfe theorem based on its analogue with Klein-Gordon equation to become Acoustic Sachs-Wolfe-Christianto-Smarandache-Umniyati (ASWoCSU) equation.

It is our hope that the new proposed equation can be verified with observation data both at lab scale and also at large scale astronomy data. But we admit that our model is still in its infancy, more researches are needed to fill all the missing details.

2. Acoustic Analogue of Space

In this section, we borrow some important ideas from C.K. Thornhill and also Tsutomu Kambe. According to Thornhill, real space-time is a four dimensional space consisting of three-dimensional space plus a fourth length dimension obtained by multiplying time by a constant speed. (This is usually taken as the constant wave-speed c of electromagnetic waves). If the four lengths, which define a four-dimensional metric (x, y, z, ict), are thought of as measured in directions mutually at right-angles, then the quadratic differential form of this metric is:[1]

$$(ds)^2 = (dx)^2 + (dy)^2 + (dz)^2 - \bar{c}^2 (dt)^2 \tag{1}$$

When the non-differential terms are removed from Maxwell's equations, i.e. when there is no charge distribution or current density, it can easily be shown that the components (E1 ,E2 ,E3) of the electrical field-strength and the components (H1 ,H2 ,H3) of the magnetic field-strength all satisfy the standard wave equation:[1]

$$\nabla \phi = \left(\frac{1}{\bar{c}^2} \right) \frac{\partial^2 \phi}{\partial t^2} \tag{2}$$

It follows immediately, therefore, that the wave surfaces of Maxwell's equations are exactly the same as those for sound waves in any uniform fluid at rest, and that Maxwell's equations can only hold in one unique reference-frame and should not remain

invariant when transformed into any other reference-frame. In particular, the equation for the envelope of all wave surfaces which pass through any point at any time is, for equation (2), and therefore also for Maxwell's equations,[1]

$$(dx)^2 + (dy)^2 + (dz)^2 = \bar{c}^2 (dt)^2 \tag{3}$$

Or

$$\frac{(dx)^2}{(dt)^2} + \frac{(dy)^2}{(dt)^2} + \frac{(dz)^2}{(dt)^2} = \bar{c}^2 \tag{4}$$

It is by no means trivial, but it is, nevertheless, not very difficult to show, by elementary standard methods, that the general integral of the differential equation (4), which passes through (x1, y1, z1) at time t1, is the right spherical hypercone[1]

$$(x - x_1)^2 + (y - y\ )^2 + (z - z_1)^2 = \bar{c}^2 (t - t_1)^2 \tag{5}$$

In other words, both Maxwell equations and space itself has the sound wave origin. We shall see later that this interpretation of Thornhill's work is consistent with the so-called acoustic Sachs-Wolfe theorem which is known in cosmology setting.

It is also interesting to remark here that Maxwell equations can be cast in the language of vortex sound theory, as follows.

Prof. T. Kambe from University of Tokyo has made a connection between the equation of vortex sound and fluid Maxwell equations. He wrote that it would be no exaggeration to say that any vortex motion excites *acoustic* waves. He considers the equation of vortex sound of the form: [2]

$$\frac{1}{c^2} \partial_t^2 p - \nabla^2 p = \rho_0 \nabla . L = \rho_0 div(\omega \times v) \tag{6}$$

He also wrote that dipolar emission by the vortex-body interaction is:[3]

$$p_F(x,t) = -\frac{P_0}{4\pi c}\dot{\Pi}_i(t-\frac{x}{c})\frac{x_c}{x^2} \tag{7}$$

Then he obtained an expression of fluid Maxwell equations as follows [4]:

$$\begin{aligned} &\nabla \cdot H = 0 \\ &\nabla \cdot E = q \\ &\nabla \times E + \partial_t H = 0 \\ &a_0^2 \nabla \times H - \partial_t E = J \end{aligned} \tag{8}$$

Where [4]:

a_0 denotes the sound speed, and

$$\begin{aligned} &q = -\partial_t(\nabla \cdot \upsilon) - \nabla \hbar, \\ &J = \partial_t^2 v + \nabla \partial_t h + a_o^2 \nabla \times (\nabla \times \upsilon) \end{aligned} \tag{9}$$

In our opinion, this new expression of fluid Maxwell equations suggests that there is a deep connection between vortex sound and electromagnetic fields. However, it should be noted that the above expressions based on fluid dynamics need to be verified with experiments. We should note also that in (8) and (9), the speed of sound a_0 is analogous of the speed of light in Maxwell equations, whereas in equation (6), the speed of sound is designated "c" (as analogous to the light speed in EM wave equation). For alternative hydrodynamics expression of electromagnetic fields, see [7].

The above interpretation of fluid Maxwell equations from vortex sound theory has been discussed in our recent paper, to appear in forthcoming issue of JCMNS [5].

3. Comparison between Schrödinger equation and Classical wave equation of sound

In the initial variant, the Schrodinger equation (SE) has the following form [8]:

$$\Delta\Psi + \frac{2m}{\hbar^2}\left(W + \frac{e^2}{4\pi\varepsilon_o r}\right)\Psi = 0 \tag{10}$$

The wave function satisfying the wave equation (10) is represented as:

$$\Psi = R(r)\Theta(\theta)\Phi(\varphi)T(t) = \psi(r,\theta,\varphi)T(t) \tag{11}$$

Where $\psi(r,\theta,\varphi) = R(r)\Theta(\theta)\Phi(\varphi)$ is the complex amplitude of the wave function, because

$$\Phi_m(\varphi) = C_m e^{\pm im\varphi} \tag{12}$$

For standard method of separation of variables to solve spherical SE, see for example [11-13].

The Φ, Θ and T equations were known in the theory of wave fields. Hence these equations presented nothing new. Only the R was new. Its solution turned out to be *divergent*. However, Schrödinger together with H. Weyl (1885-1955), contrary to the logic of and all experience of theoretical physics, artificially cut off the divergent power series of the radial function R(r) at a κ-th term. This allowed them to obtain the radial solutions, which, as a result of the cut off operation, actually were the fictitious solutions.[8]

Furthermore, it can be shown that the time-independent SE [9][10]:

$$\nabla\Psi + \frac{2m}{\hbar^2}(E - V)\Psi = 0, \tag{13}$$

Can be written in the form of standard wave equation [8]:

$$\nabla\Psi + k^2\Psi = 0, \tag{14}$$

Where

$$k = \pm\sqrt{\frac{2m}{\hbar^2}(E-V)}\,. \tag{15}$$

Or if we compare (14) and (10), then we have [8]:

$$k = \pm\sqrt{\frac{2m}{\hbar^2}\left(W + \frac{e^2}{4\pi\varepsilon_o r}\right)}\,. \tag{16}$$

This means that the wave number k in Schrödinger's radial wave equation is a quantity that varies continuously in the radial direction. Is it possible to imagine a field where the wave number, and hence the frequency, change from one point to another in the space of the field? Of course, it is not possible. Such wave objects do not exist in Nature.

The unphysical nature of Schrödinger wavefunction has created all confusing debates throughout 90 years. But it is rarely discussed in QM textbooks, on how he arrived at his equation. It is known that Schrodinger began with Einstein's mass-energy relation then he proceeded with Hamilton-Jacobian equation. At first he came to a similar fashion of Klein-Gordon equation, but then he arrived to a new equation which is non-relativistic. Logically speaking, he began with a relativistic assumption and he came to a nonrelativistic expression, and until now physicists remain debating on how to relativize Schrodinger equation. That is logically inconsistent and therefore unacceptable, and Schrodinger himself never knew where the problem lies. Until now people remain debating the problem of the meaning of his wavefunction, but it starts with unphysical

nature of his equation. This is a common attitude of many young physicists who tend to neglect the process and logical implication of QM derivation, and they never asked about whether Schrodinger equation has deep logical inconsistency or not.

Moreover, there are some limitations in applying Schrödinger equation to experiments, although many textbooks on QM usually overlook existing problems on how to compare 3D spherical solution of Schrodinger equation with experimental data. The contradiction between QM and experiments are never discussed publicly, and this is why the most modern physicists hold the assertion that QM describes accurately "ALL" physical experiments; that is an unfounded assumption. George Shpenkov began with classical wave equation and he is able to derive a periodic table of elements which is very close to Mendeleev's table. And this is a remarkable achievement which cannot be done with standard wave mechanics.[1]

Nonetheless, equation (14) and (15) which suggests analogy between wave mechanics and sound wave equation has been discussed briefly by Hilbert & Batelaan [14]. And it seems worthy to explore further in experiments.

4. Derivation of Klein-Gordon equation from the Classical Wave equation

It is also possible to find theoretical correspondence between classical electromagnetic wave equation and Klein-Gordon equation. Such a correspondence has been discussed by David Ward & Sabine Volkmer [15]. They give a simple derivation of the KGE, which

[1] For further discussion, it is advisable to check the website of Dr. George Shpenkov, at http://shpenkov.janmax.com. See especially Shpenkov, George P. 2013. *Dialectical View of the World: The Wave Model (Selected Lectures).* Volume I: Philosophical and Mathematical Background. URL: http://shpenkov.janmax.com/Vol.1.Dialectics.pdf

requires only knowledge of the electromagnetic wave equation and the basics of Einstein's special theory of relativity.

They begin with electromagnetic wave equation in one dimensional case:

$$\frac{\partial^2 E}{\partial x^2} - \frac{1}{c^2}\frac{\partial^2 E}{\partial t^2} = 0. \tag{17}$$

This equation is satisfied by plane wave solution:

$$E(x,t) = E_0 e^{i(kx-\omega t)}, \tag{18}$$

Where $k = \frac{2\pi}{\lambda}$ and $\omega = 2\pi\nu$ are the spatial and temporal frequencies, respectively. Substituting equation (18) into (17), then we obtain:

$$\left(\frac{\partial^2}{\partial x^2} - \frac{1}{c^2}\frac{\partial^2}{\partial t^2}\right) E_0 e^{i(kx-\omega t)} = 0 \tag{19}$$

Or

$$\left(k^2 - \frac{\omega^2}{c^2}\right) E_0 e^{i(kx-\omega t)} = 0 \tag{20}$$

Solving the wave vector, we arrive at dispersion relation for light in free space: $k = \frac{\omega}{c}$.

Note that this is similar to wave number k in equation (14).

Then, recall from Einstein and Compton that the energy of a photon is $\varepsilon = h\nu = \hbar\omega$ and the momentum of a photon is $p = \frac{h}{\lambda} = \hbar k$. We can rewrite equation (18) using these relations:

$$E(x,t) = E_0 e^{\frac{i}{\hbar}(px-\varepsilon t)}, \tag{21}$$

Substituting this equation into (17) we find:

$$-\frac{1}{\hbar^2}\left(p^2-\frac{\varepsilon^2}{c^2}\right)E_0 e^{\frac{i}{\hbar}(px-\varepsilon t)}=0 \tag{22}$$

Then we get an expression of relativistic total energy for a particle with zero rest mass:

$$\varepsilon^2 = p^2c^2 . \tag{23}$$

We now assume with de Broglie that frequency and energy, and wavelength and momentum, are related in the same way for classical particles as for photons, and consider a wave equation for non-zero rest mass particles. So we want to end up with:

$$\varepsilon^2 = p^2c^2 + m^2c^4 . \tag{24}$$

Inserting this equation (24) into equation (22), it is straightforward from (19), that we get:

$$\left(\nabla^2-\frac{m^2c^2}{\hbar^2}\right)\Psi=\frac{1}{c^2}\frac{\partial^2\Psi}{\partial t^2} \tag{25}$$

which is the Klein-Gordon equation for a free particle [15].

Having derived KGE from classical electromagnetic wave equation, now we are ready to discuss its implication in description of elementary particles. This will be discussed in the next section.

Interestingly, it can be shown that by using KGE one can describe hydrogen atom including electron spin without having to resort to the complicated Dirac equation [16]. It also appears worthnoting here that Meessen workout a description of elementary particles

from excitation of spacetime, by starting from KGE and a novel assumption of quantized spacetime dx=n.a.[17]

However, we will not discuss Ducharme's and Meessen's approach here, instead we will put more attention on how to extend Acoustic Sachs-Wolfe theorem by virtue of KGE.

5. Acoustic Sachs-Wolfe theorem and its plausible extension

According to Czaja, Golda, and Woszczyna [19], if one considers the acoustic field propagating in the radiation-dominated ($p=\varepsilon/3$) universe of arbitrary space curvature ($K=0,\pm1$), then the field equations are reduced to the d'Alembert equation in an auxiliary static Robertson-Walker spacetime. This is related to the so-called *Sachs-Wolfe acoustic* theorem, which can be found useful in the observation and analysis of Cosmic Microwave Background anisotropies.

In the meantime, there are papers suggesting that the integrated Sachs-Wolfe theorem may be useful to study dark energy, but we do not enter in such a discussion. See [22] for instance.

The Sachs–Wolfe acoustic theorem refers to the spatially flat ($K=0$), hot ($p=\varepsilon/3$) Friedmann–Robertson–Walker universe and the scalar perturbation propagating in it. The theorem states that with the appropriate choice of the perturbation variable, one can express the propagation equation in the form of d'Alembert's equation in Minkowski spacetime. Scalar perturbations in the flat, early universe propagate like electromagnetic or gravitational waves ([18], p. 79).

On the other hand, the wave equation for the scalar field of the dust (p=0) cosmological model can be transformed into the d'Alembert equation in the static Robertson–Walker spacetime, regardless of the universe's space curvature (see [18]). Therefore, we can suppose that the flatness assumption in the Sachs–Wolfe theorem is not needed and that the theorem is true in the general case. The proof of this fact, formulated as a symbolic computation, is presented in the first section of this paper.

In accordance with Czaja, Golda, and Woszczyna [19], we begin with Robertson–Walker metrics in spherical coordinates $x^{\sigma=\{\eta,\chi,\vartheta,\phi\}}$:

$$g_{(\mathcal{RW})} = a^2(\eta)\begin{bmatrix} -1 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 \\ 0 & 0 & \frac{\sin^2(\sqrt{K}\chi)}{K} & 0 \\ 0 & 0 & 0 & \frac{\sin^2(\sqrt{K}\chi)\sin^2(\vartheta)}{K} \end{bmatrix} \tag{26}$$

with the scale factor $a(\eta)$ appropriate for the equation of state $p=\varepsilon/3$,

$$a(\eta) = \frac{\sin(\sqrt{K}\chi)}{\sqrt{K}}. \tag{27}$$

Let us define a new perturbation variable Ψ with the help of the second-order differential transformation of the density contrast δ,

$$\Psi(x^\sigma) = \frac{1}{\cos(\sqrt{K}\chi)}\frac{\partial}{\partial\eta}\left(\frac{K}{\tan^2(\sqrt{K}\chi)}\frac{\partial}{\partial\eta}\left(\frac{\tan^2(\sqrt{K}\chi)}{K}\cos(\sqrt{K}\chi)\delta(x^\sigma)\right)\right). \tag{28}$$

The function $\Psi(x^{\sigma})$ is the solution of the d'Alembert equation:

$$\frac{\partial^2}{\partial\eta^2}\Psi(x^\sigma) - \frac{1}{3}\Delta\Psi(x^\sigma) = 0, \tag{29}$$

with the Beltrami–Laplace operator Δ acting in this space,

$$ {}^{(3)}g = \begin{bmatrix} 1 & 0 & 0 \\ 0 & \dfrac{\sin^2(\sqrt{K}\chi)}{K} & 0 \\ 0 & 0 & \dfrac{\sin^2(\sqrt{K}\chi)\sin^2(\vartheta)}{K} \end{bmatrix}. \tag{30} $$

The Beltrami–Laplace operator Δ is defined as follow

$$ \Delta = {}^{(3)} \; g_{mn}\nabla^m\nabla^n . \tag{31} $$

And it can be considered as an extension of Laplace operator for curved space.

Now let us discuss a basic question: what is Laplace-Beltrami operator? In differential geometry, the Laplace operator can be generalized to operate on functions defined on surfaces in Euclidean space and, more generally, on Riemannian and pseudo-Riemannian manifolds. This more general operator goes by the name Laplace-Beltrami operator, after Pierre-Simon Laplace and Eugenio Beltrami. Like the Laplacian, the Laplace-Beltrami operator is defined as the divergence of the gradient, and is a linear operator taking functions into functions. The operator can be extended to operate on tensors as the divergence of the covariant derivative. Alternatively, the operator can be generalized to operate on differential forms using the divergence and exterior derivative. The resulting operator is called the Laplace-de Rham operator (named after Georges de Rham).

Now, considering the formal equivalence between the form of (29) with KGE (25), minus the mass term, then it seems reasonable to include the mass term into (29). Then the extended version of equation (29) may be written as:

$$\frac{\partial^2}{\partial \eta^2}\Psi\left(x^\sigma\right)-\frac{1}{3}\Delta\Psi\left(x^\sigma\right)=-I\frac{m^2c^2}{\hbar^2}\Psi \quad , \tag{32}$$

Where I is identity matrix as follows:

$$I=\begin{bmatrix}1 & 0 & 0\\ 0 & 1 & 0\\ 0 & 0 & 1\end{bmatrix}. \tag{33}$$

The above equations (32) and (33) can be considered as a plausible extension of Acoustic Sachs-Wolfe theorem based on its analogue with Klein-Gordon equation to become Acoustic Sachs-Wolfe-Christianto-Smarandache-Umniyati (ASWoCSU) equation. Its usefulness remains to be verified with observation data.

6. A novel method of cancer therapy with frequency

Cancer constitutes one of the most serious causes of death worldwide and according to WHO, it accounted for 7.6 million deaths (around 13% of all deaths) in 2008 [23]. Deaths from cancer are projected to continue rising to over 11 million in 2030 [23]. Cancer is the end result of a series of genetic alterations that modify the control of proteins that promote (i.e. oncogenesis) or inhibit (i.e. suppressor genes) cell proliferation [23].

It is known that conventional chemotherapy has average success rate of less than 25%, which seems to suggest that we need a better therapy for cancer. Chemotherapy and radiation employ non-specific toxic effects to inhibit the proliferation of both normal and tumor cells.

Hence side effects include hair loss, digestive problems and immune suppression. In order to reduce toxicity, current academic and pharmaceutical investigations are focusing on identifying novel methods to reverse cancer specific alterations in oncogenes or suppressor genes.

In this regard, specific low frequency EMT has been reported to restore the homeostatic function of genes involved with controlling cell growth. An assembly of cells, as in a tissue or organ, will have certain collective frequencies that regulate important processes, such as cell division. Hence, providing the correct or "healthy" frequency that entrains the oscillations back to coherence can restore growth control.[23]

Published studies using cancer cell cultures and animal tumor models demonstrate that EMT induces cell death (i.e. apoptosis). The correlation between cell membrane potential and cancer cell proliferation was detailed in a classic paper by Cone (1970), see [23].

In vivo: several studies come to prove that anticancer activity of certain electric fields. In one of them, low intensity, intermediate frequency (100-300 kHz), alternating electric fields were used in in vivo treatment of tumours in C57BL/6 and BALB/c mice (B16F1 and CT-26 syngeneic tumour models, respectively) and induced significant slowing of tumour growth and extensive destruction of tumour cells within 306 days.[23].

In another study of Barbault et al., it is proposed that a combination of tumour-specific frequencies may have a therapeutic effect. A total of 1524 frequencies, ranging from 0.1 to 114 kHz, were identified from 163 cancer patients, while a compassionate treatment was offered to 28 patients with advanced cancer (breast, ovarian, pancreas, colon, prostate, sarcoma, and other types). None of the patients, who received experimental therapy, reported any side effects of significance. Thus, the tumour-specific frequencies provide an effective and well tolerated treatment which may present anti-tumour properties in end-stage patients [23].

In the meantime, the study of cancer treatment with nanoparticles in an oscillating

magnetic field began in the 1950s. In the late 1970s, researchers suggest that special coatings on the magnetic nanoparticles would cause them to selectively penetrate into cancer cells. This concept would allow intravene delivery of the nanoparticles into the body, followed by natural aggregation of the cancer tumor with nanoparticles. Recent developments in biochemistry make this novel approach feasible. Once selective coatings is available, electromagnetic heating will offer the unique advantage of selective heating only the cancer tumor. [23]

7. Discussion and Concluding Remarks

We have discussed how the very definition of Newtonian space can be related to sound wave and also Maxwell equations, and also how fluid Maxwell equations can be formulated based on vortex sound theory.

We have also discussed the inadequacies of Schrodinger equation as a description of elementary particles, instead we established connection from classical electromagnetic wave equation to Klein-Gordon equation.

Then we discuss Acoustic Sachs-Wolfe theorem which is worthy to investigate further in the context of cosmology. We also propose an extension of Acoustic Sachs-Wolfe to become ASWoCYU. In other words, it appears very reasonable to model the Universe and Cosmos in general in terms of sound wave equation.

To summarize, in this paper we tried our best to offer a novel picture of the Universe as a guitar. Further observation and experiments are recommended to verify the above propositions.

Added note: some of the above results have been presented in few earlier works of the first author (VC).

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Special thanks to Prof. Akira Kanda, Dr. George Shpenkov and Dr. Volodymyr Krasnoholovets. VC dedicates this paper for Jesus Christ, He is the Logos, the true Savior of the Universe and all creation, and the Good Shepherd.

As closing words, allow us to quote from David's book of Psalm:

"*The heavens declare the glory of God;*
The skies proclaim the work of His hands.
Day after day they pour forth speech;
Night after night they display knowledge.
There is no speech or language where their voice is not heard.
Their voice goes out into all the earth,
Their words to the ends of the world." (Psalm 19:1-4; NIV)

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Two Applications of Riccati ODE in Nonlinear Physics and Their Computer Algebra Solutions

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Abstract

In this paper, we will solve 2 Riccati ODEs using Maxima computer algebra package with applications in: (a) generalized Gross-Pitaevskii equation, (b) cosmology problem. The results presented below deserve further investigations in particular for comparison with existing analytical solutions.

1. Introduction

The Riccati equation, named after the Italian mathematician Jacopo Francesco Riccati, is a basic first-order nonlinear ordinary differential equation (ODE) that arises in different fields of mathematics and physics.[4]

Riccati differential equations are known to have many applications in nonlinear physics [1]. In this paper, we will explore only 4 of possible applications of Riccati ODE in literature, i.e. (a) generalized Gross-Pitaevskii equation, (b) KdV-Burgers equation, (c) Ramanujan differential equation, and (d) cosmology problem.

Instead of using standard solution method to solve Riccati ODE, we will use Maxima computer algebra package.

We hope that our results may stimulate further serious investigation on finding numerical solutions of Riccati ODE in various domains of nonlinear physics, number theory, and cosmology.

2. Problem 1: Generalized Gross-Pitaevskii equation (GPE)

The authors in [4] presented the generalized GPE in (3+1)D for the BEC wave function u(x,y,z,t) with distributed time-dependent coefficients: [4]

$$i\partial_t u + \frac{\beta(t)}{2}\Delta u + \chi(t)|u|^2 u + \alpha(t)r^2 u = i\gamma(t)u, \tag{1}$$

Which can be transformed easily into a Riccati ODE form as follows:

$$\frac{da}{dt} + 2\beta(t)a^2 - \alpha(t) = 0 \tag{2}$$

The above Riccati ODE (2) can be rewritten as follows:[3]

$$a(t)'+2.b(t)\cdot a(t)^2 - c(t) = 0. \tag{3}$$

Maxima expression of Riccati ODE (3) is as follows:[2]

'diff(a(t),t)+2*b(t)*a(t)^2-c(t)=0 (4)

The Maxima result for this problem is as shown below:

```
(%i14) 'diff(y,x)+2*b*y^2-c=0;
```

$$(\%o14)\quad \frac{d}{dx}y + 2\,b\,y^2 - c = 0$$

```
(%i16) ode2(%,y,x);
Is  b c  positive or negative?negative;
```

$$(\%o16)\quad -\frac{\operatorname{atan}\left(\frac{\sqrt{2}\,b\,y}{\sqrt{-b\,c}}\right)}{\sqrt{2}\sqrt{-b\,c}} = x + \%c$$

3. Problem 2: Cosmology problem

It can be shown that in Friedmann-Robertson-Walker spacetime the set of Einstein's equations with the cosmological constant set to zero reduce to differential equations for scale factor a(t), which is a function of comoving time t.[5] Choosing the equation of

state to be barotropic and after some transformation and introducing conformal time, the equation reduces to a Riccati equation as follows:[5]

$$u'+cu^2+kc=0, \tag{5}$$

The above equation of cosmological Riccati equation has been obtained previously by Faraoni, see [5].

Equation (5) can be rewritten for Maxima as follows:

‘diff(a(t),t)+c*a(t)^2+k*c=0 (4)

The result is given below:

(a) Option 1: k=negative constant

(%i24) 'diff(y,x)+c*(y^2+k)=0;

$$(\%o24)\quad \frac{d}{dx}y+c(y^2+k)=0$$

(%i25) ode2(%,y,x);

Is k positive or negative?negative;

$$(\%o25)\quad -\frac{\log\left(-\frac{\sqrt{-k}-y}{y+\sqrt{-k}}\right)}{2c\sqrt{-k}}=x+\%c$$

(b) Option 2: k=positive constant

(c) (%i27) 'diff(y,x)+c*(y^2+k)=0;

$$(\%o27)\quad \frac{d}{dx}y+c(y^2+k)=0$$

(%i28) ode2(%,y,x);

Is k positive or negative?positive;

$$(\%o28)\quad -\frac{\operatorname{atan}\left(\frac{y}{\sqrt{k}}\right)}{c\sqrt{k}}=x+\%c$$

4. Concluding remarks

In this paper, we solve 2 Riccati ODEs using Maxima computer algebra package with applications in: (a) generalized Gross-Pitaevskii equation, (b) cosmology problem. The results as presented below deserve further investigations in particular for comparison with existing analytical solutions.

It is highly recommended to verify these results with other computer algebra packages, such as Maple or Mathematica.

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An Outline of Cellular Automaton Universe via Cosmological KdV equation

Victor Christianto, Florentin Smarandache, Yunita Umniyati

ABSTRACT

It has been known for long time that the cosmic sound wave was there since the early epoch of the Universe. Signatures of its existence are abound. However, such a sound wave model of cosmology is rarely developed fully into a complete framework. This paper can be considered as our *second* attempt towards such a complete description of the Universe based on soliton wave solution of cosmological KdV equation. Then we advance further this KdV equation by virtue of Cellular Automaton method to solve the PDEs. We submit wholeheartedly Robert Kurucz's hypothesis that *Big Bang should be replaced with a finite cellular automaton universe with no expansion*. Nonetheless, we are fully aware that our model is far from being complete, but it appears the proposed cellular automaton model of the Universe is very close in spirit to what Konrad Zuse envisaged long time ago. It is our hope that the new proposed method can be verified with observation data. But we admit that our model is still in its infancy, more researches are needed to fill all the missing details.

Keywords: solitary wave, cosmological KdV equation, nonlinear universe, cellular automata, PDE, Mathematica, Konrad Zuse.

1. Introduction

Konrad Zuse is probably the first scholar who imagine a *Computing Universe*. In recent years, there are a few researchers who suggest similar vision in terms of cellular automata, for example Stephen Wolfram, Gerardus 't Hooft, and Robert Kurucz from Harvard Smithsonian of Astrophysics. Nonetheless, it seems that there is no existing model which can be connected with a nonlinear PDE of the Universe. In this paper, we

try to offer some working CA models based on the KdV equation, which can be modelled and solved using computer algebra packages such as Mathematica.

Meanwhile, Korteweg-de Vries (KdV) equation is a non-linear wave equation plays a fundamental role in diverse branches of mathematical and theoretical physics. Its significance to cosmology has been discussed by a number of authors, such as Rosu and recently Lidsey [3][7]. It is suggested that the KdV equation arises in a number of important scenarios, including inflationary cosmology etc. Analogies can be drawn between cosmic dynamics and the propagation of the solitonic wave solution to the equation, whereby quantities such as the speed and amplitude profile of the wave can be identified with cosmological parameters such as the spectral index of the density perturbation spectrum and the energy density of the universe.

Then we advance further this KdV equation by virtue to Cellular Automaton method to solve the PDEs. We submit wholeheartedly Kurucz's hypothesis that *Big Bang should be replaced with a finite cellular automaton universe with no expansion*.[4][5]

Nonetheless, we are fully aware that our model is far from being complete, but perhaps the proposed cellular automaton model of the Universe is very close in spirit to what Konrad Zuse envisaged long time ago. However, we do not exercise possible link between our model and Cellular automaton model of Gerard 't Hooft; that is beyond the scope of this paper.[14]

It is our hope that the new proposed equations can be verified with observation data both at lab scale and also at large scale astronomy data. We also expect that the proposed theoretical models based on CA may offer a clue to answer the great mystery of our

Universe: *the origins of life*.[17][18] This problem remains missing in most existing physical cosmology models.

Nonetheless, we admit that our model is still in its infancy, more researches are needed to fill all the missing details.

2. Cosmological KdV equation

The Korteweg-de Vries (KdV) equation is the completely integrable, third-order, non-linear partial differential equation (PDE):[3]

$$\partial_t u + \partial_x^3 u + \frac{3}{u_0} u \partial_x u = 0, \tag{1}$$

where u = u(x, t), $\partial_t = \partial/\partial t$, $\partial_x^3 = \partial^3/\partial x^3$, etc., u_0 is a constant and (x, t) represent space and time coordinates, respectively. This equation was originally derived within the context of small-amplitude, non-linear water wave theory and it is well known that it admits a solitonic wave solution of the form

$$u = u_0 \lambda^2 \sec h^2 \left[\lambda\left(x - \lambda^2 t\right)/2\right], \tag{2}$$

where the constant λ/2 represents the wavenumber of the soliton. The KdV soliton is characterized by the property that its speed and amplitude are proportional to the square of the wavenumber.

Rosu [7] and also Lidsey [3] both have considered some cosmological applications of KdV equation. We will consider here one application in inflationary universe model.

It can be shown that Friedmann equation after some steps which have been discussed in [3], yields to an equation which takes the form of (2), as follows:

$$H^2(\phi) = H_0^2 \lambda^2 \sec h^2 \left[\lambda A/2\right], \tag{3}$$

Where:

$$A = \frac{\sqrt{8\pi}}{m_p}\phi.$$

(4)

Therefore, it appears quite reasonable to consider this equation as originated from certain cosmological KdV physics.

3. Cellular Automata Model of KdV Equation: Towards Cellular Automaton Universe

There are several methods to consider discretization of KdV equation into cellular automata models. Here we briefly discuss only few methods:

a. Based on paper by Steeb & Hardy [11], KdV equation can be written as a conservation law:

$$\frac{\partial u}{\partial t} + \frac{\partial}{\partial x}\left(-\frac{u^2}{2} - \frac{\partial^2 u}{\partial x^2}\right) = 0, \tag{5}$$

It follows that, after the simplest discretization, we obtain the cellular automata:

$$u_j(t+1) = u_j(t)(u_{j+1}(t) - u_j(t)) + u_{j+2}(t) - u_{j+1}(t) - u_{j-1}(t).$$

(6)

Thus $\sum_{j=0}^{N-1} u_j(t)$ is not an invariant.

b. The discrete analogue of the KdV equation is known thanks to the pioneering work of Hirota. It has the form: [16]

$$\frac{1}{u_{l+1}^{t+1}} - \frac{1}{u_l^t} = \delta\left(u_{l+1}^t - u_l^{t+1}\right).$$

(7)

c. Another model was proposed by Tokihiro et al around twenty years ago. They suggested that an integrable discretization (differential-difference equation) of the KdV equation is the Lotka-Volterra equation [15]:

$$\frac{d}{dt}b_j(t) = b_j(t)\left[b_{j+t}(t) - b_{j-1}(t)\right]$$

(8)

In other words, it appears possible at least in theory to consider a Cellular Automaton-KdV Universe, based on discretization of the original KdV equation. Nonetheless, further analysis is required to study its potential applications.

4. Discussion and Concluding Remarks

It has been known for long time that the cosmic sound wave was there since the early epoch of the Universe. Signatures of its existence are abound.[2] However, such an acoustic model of cosmology is rarely developed fully into a complete framework from the notion of space, cancer therapy up to the sky. This paper can be considered as our second attempt towards such a complete description of the Universe based on soliton solution of cosmological KdV equation.

Then we advance further this KdV equation by virtue to Cellular Automaton method to solve the PDEs. Here, we consider some mathematical methods to discretize the original KdV equation in order to be transformed into cellular automata models.

In other words, we submit wholeheartedly Robert Kurucz's hypothesis that *Big Bang should be replaced with a finite cellular automaton universe with no expansion*.[4][5]

Nonetheless, we are fully aware that our model is far from being complete, but perhaps the proposed cellular automaton model of the Universe is very close in spirit to what Konrad Zuse envisaged long time ago.

Further observations and experiments are recommended to verify the above propositions.

Acknowledgement

The first author (VC) dedicates this paper for Jesus Christ, He is the Logos, the true Savior of the Universe and all creation, and the Good Shepherd.

As closing words, allow us to quote from David's book of Psalm:

"*The heavens declare the glory of God;*
The skies proclaim the work of His hands.
Day after day they pour forth speech;
Night after night they display knowledge.
There is no speech or language where their voice is not heard.
Their voice goes out into all the earth,
Their words to the ends of the world." (Psalm 19:1-4; NIV)

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A Non-Particle View of DNA and Its Implication to Cancer Therapy

Yunita Umniyati, Victor Christianto

Abstract. The various effects of electromagnetic fields to DNA have been reported by Luc Montagnier and his group. It has been shown that genetic information can be transmitted to water through applications of electromagnetic fields, means that DNA has wave character. Here, non-particle view of DNA challenges standard paradigm of DNA and biology. Based on frequency, it can have implications for physics of cancer.

INTRODUCTION

Over the last 60 years, the development of basic knowledge in biology as well as many medical applications owes much to the discoveries made in DNA. On the other hand, in the same times evidence has been accumulated on the influence of electromagnetic (em) fields on living organisms. The frequencies of involved em fields cover different intervals corresponding to the different scales present in the organisms. For example, in a series of reports by Prof. Luc Montagnier et al. which have caused debates all over the world, they showed that DNA has wave character. Luc Montagnier et al. discuss the appearance of a new property of DNA correlated with the induction of extremely low frequency (ELF) em fields. These fields can be induced by suitable procedures in water dilutions which become able to propagate the information contained in the DNA of the original organisms to other ones. Montagnier et al. considered a very low frequency (ELF) at the order of 7 Hz, which also occurs in nature, and it is known as Schumann resonance. In other paper, Montagnier et al. reported a novel property of DNA, that is the capacity of some sequences to emit electromagnetic waves in resonance after excitation by the ambient electromagnetic background. Owing to the low sensitivity and specificity of their signal capture and analysis, the frequencies emitted are all alike, regardless of the bacterial species involved. But their papers were based on experiments, and although a theoretical framework has been proposed, such experimental works seem to lack theoretical basis. Here, we give a theoretical basis of such a wave character of DNA based on De Broglie's matter-wave hypothesis. We prove that this matter-wave hypothesis can be interpreted such that all matter including DNA can be altered by (electromagnetic) frequencies. Nonetheless, it should be noted that other theoretical model has been proposed to explain Montagnier's experiment with liquid water [12]. In the mean time, there are related findings dating back to the 1920s which had shown the existence of emissions from living substances at the much higher frequency range of ultraviolet light. Such emission was later confirmed by Fritz-Albert Popp, a biophysicist, who named the phenomenon biophotons. Popp and colleagues demonstrated that the light was coherent, somewhat like a laser, that the emitting molecules are coupled by a coherent radiation field; and that the source is the DNA in the cell nucleus. Whole body biophoton detection in Popp's lab showed a correlation with known biological rhythms of diurnal, lunar, and other periodicity, and suggested the existence of a globally organized biophoton field for the organism. And biophotons emitted from DNA have become an established fact. Nowadays, biophotonics is a very active field of research, and it may have medical implications including cancer therapy as well [11]. Significance of this paper: It is known that modern biology including molecular biology has a core assumption, that is corpuscular view of DNA. Such an atomistic model of DNA can be traced to have its root in particle physics. If

the newly interpreted matter-wave hypothesis is true, then it implies that DNA has wave character, i.e. it can be altered and influenced by EM frequencies. It can be expected, that such a non-particle view of DNA can have impacts on all our understanding on physics of biology, including potential implications to cancer therapy too.

DNA AND DE BROGLIE'S MATTER-WAVE HYPOTHESIS

Experiments carried out by Montagnier group seem to suggest that genetic information can be transmitted to water via electromagnetic waves. This is very interesting since it challenges standard paradigm in biology [2][3]. This is also related to Gariaev's proposal of DNA wave genetic [4][5].

That cell has capability to communicate at a distance may be not surprising, since there are reports indicating that effect. But that electromagnetic field can transmit genetic information to water is interesting result which seems to bring us back to an old debate between corpuscular view and wave view of matter.

Let put aside objections on Einstein's special relativity and follow De Broglie's argument in his thesis:

$$E = \hbar f, \tag{1}$$

and

$$E = mc^2. \tag{2}$$

From equations (1) and (2) we get:

$$m = f\frac{\hbar}{c^2}. \tag{3}$$

In theory, it seems possible that E.M. field not only can transmit genetic information to water, but also E.M. frequency can alter genetic code. Here equations (4) give some hints to explain many phenomena related to Montagnier and Gariaev's experiments and may plausibly open new ways to treat DNA as quantum biocomputer [4].

PLAUSIBLE APPLICATION OF THE PROPOSED CONCEPT

To test the new concept of "all life comes from life through frequency" (*Omne vivum ex vivo via crebritudo*) which challenges the standard paradigm in biology, we suggest the following:

Let us define f as yield frequency, which is frequency where matter becomes wave, and a new parameter

$$k = \frac{\hbar}{c^2}. \tag{4}$$

Then equation (3) can be written as a ratio:

$$\frac{m}{f} = k. \tag{5}$$

In words, from the above equation we may predict that the ratio between a small mass m like photon with its yield frequency f is always a constant. The small mass here can be extended to neutrino, electron, muon etc.

One plausible application of this proposition is alternative method of cancer treatment using various frequencies. It is known that some frequencies like 444 Hz may kill cancer cell without destroying the normal cells. Such a method seems worthy to be investigated and developed further.

Montagnier and his group also use very low frequency such as 7.83 Hz, which seems to be closely related to the Schumann resonance of 7 Hz. Whether or not such a 7.83 Hz corresponds to ambient frequency of electromagnetic noise in water should be tested with experiments.

DNA AS PERTURBED SGE SOLITON

One of various models of DNA is using solitary wave [6]. Its use as a model of phyllotaxis systems including DNA has been proposed elsewhere [7][8][9][10]. Now, let consider Perturbed sine-Gordon equation (PSGE) as a model of interaction between soliton and external E.M. field.

Perturbed SGE comes in a variety forms. One common form is a damped and driven SGE [9]:

$$\Psi_{tt} + \Phi\Psi_t - \Psi_{zz} + \sin(\Psi) = F. \tag{6}$$

In addition, the following two versions of the perturbed SGE have been studied in the literature, including directly forced SGE

$$\Psi_{tt} - \Psi_{zz} + \sin(\Psi) = Mf(\omega t) \tag{7}$$

and damped and drived SGE

$$\Psi_{tt} - \Psi_{zz} + \sin(\Psi) = Mf(\omega t) - \alpha\Psi_t + \eta. \tag{8}$$

In the meantime, (2 + 1)D SGE with additional spatial coordinate y is defined as

$$\Psi_{tt} = \Psi_{xx} + \Psi_{yy} - \sin(\Psi). \tag{9}$$

Here, new insights may be expected in various biological fields.

CONCLUDING REMARK

In this paper, we prove that DNA has non-particle character in favor of experiments carried out by Luc Montagnier et al. We also propose an extension of the known adage: Omne vivum ex vivo to Omne Vivum ex Vivo via Crebritudo" (Eng.: every life comes from other life through frequency). We also discuss a mathematical model of DNA as solitary wave, which suggests that it is possible to alter its structure through external frequency. However, it should be noted here that theoretical basis for effects of (electromagnetic) frequency to DNA structure is far from clear. Further investigation in the proposed direction can be recommended.

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An introduction to "*spirit-filled medicine*"

(An exploration in Theology of Medicine)

Victor Christianto, Florentin Smarandache

Abstract

In the light of the fact that proper discussion of theology of medicine is quite rare, this short article highlights the fundamental problem with modern (Western) medicine. China has taken a step forward by recognizing their cultural heritage called TCM. Of course it must be acknowledged that modern (Western) medicine has been very advanced, but also many problems such as side effects and also many toxic materials due to synthetic materials. It is also well known that chemotherapy has a chance to work at a miserable rate of less than 20%, so it is reasonable to argue that the 21st century requires a conceptual, new approach to treatment.

Introduction

About two weeks ago, a respected senior professor, Prof. Dr. Bambang Hidayat, a member of the Indonesian Academy of Sciences, sent an article to a group of academics. * In essence he asked: how our response should be to China's recent policies that want to facilitate the practice of treatment based on TCM (traditional Chinese Medicine) in a balanced way. See attachment section.

To what extent we can accept or not TCM and other traditional medicines will be discussed in this article.

TCM and other approaches

His concern is certainly understandable, given the current perception of society is that traditional medicine, often referred to as alternative medicine, is usually

associated with shamanic practices or strange methods such as turtles, snakes, bruises etc., many of which have not passed any clinical trials.

But there are two important things that we should take note of Xi Jinping's new policy on TCM:
a. This policy starts from realizing that the cost of Western medicine is very expensive, mainly due to clinical trials of humans, so it is quite reasonable that the Chinese government wants to give more balanced attention to the Chinese medicine tradition.
b. Traditional Chinese medicine has grown for no less than 4000 years. However, we shall also note that there are some reports that in Asia, liver cancer can be linked to the use of (excessive) herbal medicines. Of course this needs further study. (5)
Regarding some people's concerns about the removal of clinical trials, it seems the Chinese government is quite cautious, see the following quote:

> "Lixing Lao, director of Hong Kong University's School of Chinese Medicine, says that although traditional medicines will no longer need to go through clinical trials, the CFDA will still require remedies to undergo preclinical pharmacological testing and drug-toxicity studies in animals or cells to gain approval."(2)

Certainly it can be expected that the new policy will further strengthen the interest of people to develop and produce drugs based on herbs that have been known to be useful for thousands of years, rather than synthetic (artificial) substances that could potentially not be processed and become toxic.) (4)

In Indonesia, it is also known a variety of medicinal plants, and there are several apps that provide catalog of such live pharmacies. One of which can be called for example is gendola, which reportedly efficacious for diabetes, cancer, stroke, coronary heart, liver etc. Of course clinical trials are required for this gendola. (6)

The fundamental problem of modern medicine (Western)

There are several scientific authors who express vividly how fundamental the problem with modern (Western) medicine. The fundamental problem is commonly expressed with a *mechanistic* worldview as well as a Cartesian dualism philosophy. (1) (11).

Sheldrake has revealed that the mechanistic view is actually derived from Neo-Platonic philosophy, so it is not based on biblical teaching.

A similar argument was developed by Fritjof Capra in his famous book, The Turning Point. (8)

Similarly, Christian philosopher Alvin Plantinga has written a paper criticizing materialism. (12)

Unfortunately, however, the thinking of scientists from such disciplines often fails in the midst of massive dis-information (and advertising) that modern (Western) medicine has managed to address almost all human health problems. Is that true?

Let's take a look at the colonial post-reading of Gen. 2: 7 and some other texts.

The post-colonial reading of Gen. 2: 7

If we glance at Gen. 2: 7, we see at a glance that man is made up of the dust of the ground (*adamah*) which is breathed by the breath of life by God (*nephesh*). Here we can ask, does this text really support the Cartesian dualism view?

We do not think so, because the Hebrew concept of man and life is integral. The bottom line: it is not the spirit trapped in the body (Platonic), but the body is flowing in the ocean of spirit. (9) This means that we must think of as an open possibility for developing an integral treatment approach (Ken Wilber), or perhaps more properly called "**spirit-filled medicine**." (10).

Let's look at three more texts:

a. Gen. 1: 2, "The earth is without form and void, darkness over the deep, and the Spirit of God hovering over the waters." Patterns such as Adam's creation

can also be encountered in the creation story of the universe. Earth and the oceans already exist (similar to adamah), but still empty and formless. Then the Spirit of God hovered over it, in the original text "*ruach*" can be interpreted as a strong wind (storm). So we can imagine there is wind/hurricane, then in the storm that God said, and there was the creation of the universe. From a scientific point of view, it is well known in aerodynamics that turbulence can cause sound (turbulence-generated sound). And primordial sound waves are indeed observed by astronomers.

b. Ps. 107: 25, "He said, he raised up a storm that lifted up his waves." The relation between the word (sound) and the storm (turbulence) is interactive. Which one can cause other. That is, God can speak and then storms, or the Spirit of God causes a storm. Then came the voice.

c. Ezekiel. 37: 7, "Then I prophesy as I am commanded, and as soon as I prophesy, it sounds, indeed, a crackling sound, and the bones meet with one another." In Ezekiel it appears that the story of the creation of Adam is repeated, that the Spirit of God is blowing (storm), then the sound of the dead bones arises.

The conclusion of the three verses above seems to be that man is made up of adamah which is animated by the breath or Spirit of God. He is not matter, more accurately referred to as spirit in matter. Like a popular song around 80s goes: "*We are spirits in the material world*." See also Amos Yong, (7). Therefore, it is inappropriate to develop only materialistic or Cartesian dualism treatment. We can develop a more integral new approach. (1)

The integral view of humanity and spirituality, instead of two-tiered Western view of the world, appears to be more in line with majority of people in underdeveloping countries, especially in Asia and Africa. See for instance the work by Paul Hiebert (14).

Among the studies supporting such an integral approach is the view that cells are waves, see the paper from Prof. Luc Montagnier. (13) (15). And also our paper on the wave nature of matter, as well as the possibility of developing a wave-based (cancer) treatment. (16) (17) **

Concluding remarks

This short article highlights the fundamental problem with modern (Western) medicine. China has taken a step forward by recognizing their cultural heritage called TCM. Of course it must be acknowledged that modern (Western) medicine has been very advanced, but also many problems such as side effects and also many toxic materials due to synthetic materials. It is also well known that chemotherapy has a chance to work for less than 20%, so it is reasonable to argue that the 21st century requires a conceptual, new approach to treatment.

We hope this short article may inspire younger generation of physicists and biologists to rethink and renew their approaches to Nature, and perhaps it may also help to generate new theories which will be useful for a better future of mankind.

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This paper is dedicated to our Lord and the Good Shepherd, Jesus Christ, whose works and ministry have inspired this paper.

note:

* thanks to Prof. Dr. Bambang Hidayat, a member of the Indonesian Academy of Sciences

** Our paper on non-particle view of DNA was once presented at the 2016 ICTAP conference in Makassar by coauthor.

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Appendix: Nature News, 30 november 2017

China to roll back regulations for traditional medicine despite safety concerns

Article by David Gray from Reuters

Scientists fear plans to abandon clinical trials of centuries-old remedies will put people at risk.

The Chinese government is promoting traditional Chinese medicines as an alternative to expensive Western drugs.

Support for traditional medicine in China goes right to the top. President Xi Jinping has called this type of medicine a “gem” of the country’s scientific heritage and promised to give alternative therapies and Western drugs equal government support. Now the country is taking dramatic steps to promote these cures even as researchers raise concerns about such treatments.

From early next year, traditional Chinese medicines may no longer be required to pass safety and efficacy trials in humans in China. Draft regulations announced in October by the China Food and Drug Administration (CFDA) mean traditional medicines can skip such costly and time-consuming trials as long as manufacturers prepare ingredients using essentially the same method as in classic Chinese formulations. The State Administration of Traditional Chinese Medicine and the CFDA will compose a list of the approved methods.

The Chinese government has been forcefully promoting traditional Chinese medicines (TCMs) as an alternative to expensive Western drugs. Doctors of Chinese medicine have welcomed the new policy, saying that it will make it easier for companies who produce such medicines to get drugs approved and make them available to patients. Lixing Lao, director of Hong Kong University's School of Chinese Medicine, says that although traditional medicines will no longer need to go through clinical trials, the CFDA will still require remedies to undergo preclinical pharmacological testing and drug-toxicity studies in animals or cells to gain approval.

Safety concerns

But scientists say that safety concerns continue to plague the industry, and that minimizing clinical-trial requirements could put more patients at risk. On 23 September, the CFDA recalled batches of two injectable TCMs after about ten people fell ill with fevers and chills.

Less than a month later, on 18 October, researchers in Singapore and Taiwan published a study in Science Translational Medicine linking liver cancer to aristolochic acid, an ingredient widely used in traditional remedies1. Lead author Steven Rozen, a cancer-genomics researcher at Duke-NUS Medical School in Singapore, is convinced that aristolochic acid contributed to the mutations, but says it's harder to determine to what extent it caused the tumours.

Aristolochic acid has also been linked to cancers of the urinary tract and can cause fatal kidney damage2, 3. Rozen says it is still in common use, despite warnings from the US Food and Drug Administration that it is associated with kidney disease. "It would be a good time to reassess regulations" of aristolochic acid, he says.

Lao sees people take remedies containing aristolochic acid every day, and says it should not cause problems if taken “moderately and to treat diseases” rather than as a regular supplement. He says more research is needed into how to ensure the safe use of the potentially toxic substance. Overall, Lao is not concerned about safety issues with traditional medicines because, “unlike Western drug development, these herbal formulas have been used for hundreds and thousands of years,” he says.

But Li Qingchen, a paediatric surgeon at the Harbin Children’s Hospital and a well-known critic of TCMs, says the recent recalls of remedies show that current safety measures aren’t adequate. He says doctors need to inform the public about some of the dangers associated with traditional medicines, but that most are unwilling to speak out against them. “Few doctors would dare to publicly criticize TCMs,” he says. Li thinks that the government’s promotion of TCMs will make it harder for scientists to criticize the drugs “because the matter gets escalated to a political level and open discussions become restricted”.

Criticism muted

With strong government support for the alternative medicines industry, Chinese censors have been quick to remove posts from the Internet that question its efficacy. On 23 October, an article on a medical news site that called for closer attention to the risks of aristolochic acid was removed from social media site WeChat. The story had been viewed more than 700,000 times in three days.

Debate over TCMs has been silenced before in China. Last year, a Beijing think tank — the Development Research Center of the State Council — proposed banning the practice of extracting Asiatic black bear bile, another common ingredient in TCMs. The think tank’s report questioned the remedy’s efficacy and suggested using synthetic alternatives. It was removed from the think tank's website after the Chinese Association of Traditional Chinese Medicine, which supports the development of TCM, called it biased and demanded an apology.

As well as reducing regulations for TCMs, the Chinese government has made it easier to become a doctor of traditional medicine and to open hospitals that use the approach. Since July 2017, students studying traditional medicine no longer need to pass the national medical exams based on Western medicine.

Instead, traditional medicine students can attend apprenticeship training and pass a skills test. And practitioners who want to open a clinic no longer need approval from the CFDA. They need only register with the authority.

The government's ultimate goal is to have all Chinese health-care institutions provide a basic level of TCMs by 2020. A roadmap released in February 2016 by the State Council, China's highest administrative body, plans to increase the number of TCM-licensed doctors to 4 per 10,000 people, an increase from less than 3 practitioners per 10,000 people. The government also wants to push TCMs' share of pharmaceutical sales from 26% to 30% by the end of the decade.

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Modeling Virus as Elastic Sphere in Newtonian Fluid based on 3D Navier-Stokes Equations

Victor Christianto, Florentin Smarandache

ABSTRACT

Although virus is widely known to significantly affect many biological form of life, its physical model is quite rare. In this regard, experiments on the acoustic vibrations of elastic nanostructures in fluid media have been used to study the mechanical properties of materials, as well as for mechanical and biological sensing. The medium surrounding the nanostructure is typically modeled as a Newtonian fluid. In this paper, we present a mathematical model of virus as an elastic sphere in a Newtonian fluid, i.e. via 3D Navier-Stokes equations. We also obtain a numerical solution by the help of Mathematica 11.

Keywords: Newtonian fluid, virus model, 3D Navier-Stokes equations, nonlinear physics, computational physics

1. Introduction

Although virus is widely known to significantly affect many biological form of life, its physical model is quite rare. In a paper, L.H. Ford wrote:

> "Two simple models for the particle are treated, a liquid drop model and an elastic sphere model. Some estimates for the lowest vibrational frequency are given for each model. It is concluded that this frequency is likely to be of the order of a few GHz for particles with a radius of the order of 50nm." [1]

Such an investigation on acoustic vibration of virus particles may resonate with other reports by Prof. Luc Montagnier [8][9] and also our own hypothesis [10][11], on *wave character of biological entities* such as DNA, virus, water etc.

In this regard, there are studies on the mechanical properties of (biology) materials based on experiments on the acoustic vibrations of elastic nanostructures in fluid media, where the medium surrounding the nanostructure is typically modeled as a Newtonian fluid.

In this paper we will also discuss a Newtonian fluid, i.e. 3D Navier-Stokes equations.

It is our hope that the new proposed method can be verified with experiments.

2. A model of linearized Navier-Stokes equations

In 2015, Vahe Galstyan, On Shun Pak and Howard A. Stone published a paper where they discuss breathing mode of an elastic sphere in Newtonian and complex fluids.[2] They consider the radial vibration of an elastic sphere in a compressible viscous fluid, where the displacement field of the elastic fluid medium is governed by the Navier equation in elasticity. This spherically symmetric motion is also called the *breathing mode*.

They use a linearized version of Navier-Stokes equations, as follows:[2]

$$\rho_v \frac{\partial v}{\partial t} = -\nabla p + \eta \nabla^2 v + \left(\kappa + \frac{\eta}{3}\right)\nabla, \tag{1}$$

where ρ_v is the density of the fluid, η is the shear viscosity, κ is the bulk viscosity, and p is the thermodynamic pressure.

There are other authors who work on linearized NS problem, here we mention a few of them: Foias and Saut [12]; Thomann & Guenther [13]; A. Leonard [14].

3. Numerical solution of 3D Navier-Stokes equations

In fluid mechanics, there is an essential deficiency of the analytical solutions of non-stationary 3D Navier–Stokes equations. Now, instead of using linearized NS equations as

above, we will discuss a numerical solution of 3D Navier-Stokes equations based on Sergey Erhskov's papers [4][5].

The Navier-Stokes system of equations for incompressible flow of Newtonian fluids can be written in the Cartesian coordinates as below (under the proper initial conditions):[4]

$$\nabla.\vec{u} = 0, \tag{2}$$

$$\frac{\partial \vec{u}}{\partial t} + (\vec{u} \cdot \nabla)\vec{u} = -\frac{\nabla p}{\rho} + \nu \cdot \nabla^2 \vec{u} + \vec{F}. \tag{3}$$

Where u is the flow velocity, a vector field, ρ is the fluid density, p is the pressure, v is the kinematic viscosity, and F represents external force (per unit mass of volume) acting on the fluid.[4]

In ref. [4], Ershkov explores new ansatz of derivation of non-stationary solution for the Navier–Stokes equations in the case of incompressible flow, where his results can be written in general case as a mixed system of 2 coupled-Riccati ODEs (in regard to the time-parameter t). But instead of solving the problem analytically, we will try to find a numerical solution with the help of computer algebra package of Mathematica 11.

The coupled Riccati ODEs read as follows:[4]

$$a' = \frac{w_y}{2} \cdot a^2 - (w_x \cdot b) \cdot a - \frac{w_y}{2}(b^2 - 1) + w_z \cdot b, \tag{4}$$

$$b' = -\frac{w_x}{2} \cdot b^2 + (w_y \cdot a) \cdot b + \frac{w_x}{2}(a^2 - 1) - w_z \cdot a. \tag{5}$$

First, equations (4) and (5) can be rewritten in the form as follows:

$$x(t)' = \frac{v}{2} \cdot x(t)^2 - (u \cdot y(t)) \cdot x(t) - \frac{v}{2}(y(t)^2 - 1) + w \cdot y(t), \tag{6}$$

$$y(t)' = -\frac{u}{2}\cdot y(t)^2 + (v\cdot x(t))\cdot y(t) + \frac{u}{2}(x(t)^2 - 1) - w\cdot x(t)\,. \tag{7}$$

Then we can put the above equations into Mathematica expression:[3]

```
v=1;
u=1;
w=1;
{xans6[t_], vans6[t_]}=
{x[t],y[t]}/.Flatten[NDSolve[{x'[t]==(v/2)*x[t]^2-(u*y[t])*x[t]-(v/2)*(y[t]^2-1)+w*y[t], y'[t]==-
(u/2)*y[t]^2+(v*x[t])*y[t]+(u/2)*(x[t]^2-1)-w*x[t], x[0]==1,y[0]==0}, {x[t],y[t]},{t,0,10}]]

graphx6 = Plot[xans6[t],{t,0,10}, AxesLabel->{"t","x"},PlotStyle->Dashing[{0.02,0.02}]];
Show[graphx6,graphx6]
```

The result is as shown below:[3]

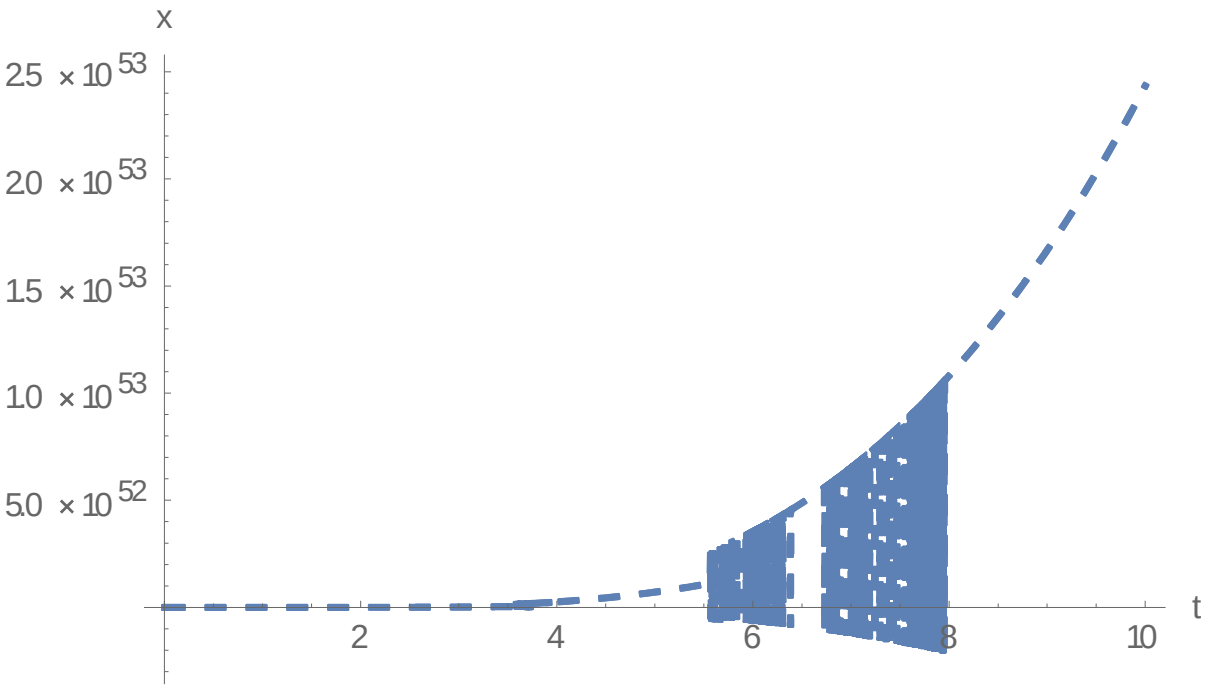

DIAGRAM 1. Graphical plot of solution for case v=u=w=1. See [3]

4. Concluding Remarks

In this paper we review 3D non-stationary Navier-stokes equations obtained by Ershkov, as a model of virus as an elastic sphere in Newtonian fluid, and we solve the equations numerically with Mathematica 11.

It is our hope that the above numerical solution of 3D Navier-Stokes equations can be found useful in biological modeling of virus.

All in all, here we would like to emphasize that such an investigation on acoustic vibration of virus particles may resonate with other reports by Prof. Luc Montagnier and also our own hypothesis, on *wave character of biological entities* such as DNA, virus, water etc.

We are quite optimistic that this novel approach can lead to new kinds of nanomedicine of virus based on acoustic vibration in Newtonian fluid medium.

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A Review of Two Derivations of Maxwell-Dirac Isomorphism and a Few Plausible Extensions

Victor Christianto

Abstract

The problem of the formal connection between electrodynamics and wave mechanics has attracted the attention of a number of authors, especially there are some existing proofs on Maxwell-Dirac isomorphism. Here the author will review two derivations of Maxwell-Dirac isomorphism i.e. by Hans Sallhofer and Volodimir Simulik. A few plausible extensions will be discussed too.

Introduction

There are some papers in literature which concerned with the formal connection between classical electrodynamics and wave mechanics, especially there are some existing proofs on Maxwell-Dirac isomorphism. Here the author will review two derivations of Maxwell-Dirac isomorphism i.e. by Hans Sallhofer and Volodimir Simulik.

While we are aware that the papers of those mentioned authors are quite old, we will discuss some recent papers which seem to point out to new development in classical electrodynamics, for instance the use of quaternion algebra and also the notion of longitudinal wave solution of Maxwell equations.

Hans Sallhofer's method

Summing up from one of Sallhofer's papers[1], he says that under the sufficiently general assumption of periodic time dependence the following connection exists between source-free electrodynamics and wave mechanics:

$$\sigma \cdot \left[\begin{array}{c} rotE + \dfrac{\mu}{c}\dfrac{\partial}{\partial t} H = 0 \\ rotH - \dfrac{\varepsilon}{c}\dfrac{\partial}{\partial t} H = 0 \\ div\,\varepsilon E = 0 \\ div\,\mu H = 0 \end{array} \right]_{divE=0} \equiv \left[(\gamma \cdot \nabla + \gamma^{(4)} \partial_4) \Psi = 0 \right] \qquad (1)$$

In words: Multiplication of source-free electrodynamics by the Pauli-vector yields wave mechanics.[1] In simple terms, this result can be written as follows:

$$P \cdot M = D\,, \qquad (2)$$

Where:

P = Pauli vector,

M = Maxwell equations,

D = Dirac equations.

We can also say: Wave mechanics is a solution-transform of electrodynamics. Here one has to bear in mind that the well-known circulatory structure of the wave functions, manifest in Dirac's hydrogen solution, is not introduced just by the Pauli-vector.[1]

Volodimir Simulik's method

Simulik described another derivation of Maxwell-Dirac isomorphism. In one of his papers[2], he wrote a theorem suggesting that the Maxwell equations of source-free electrodynamics which can be written as follows:

$$\begin{aligned} rotE + \frac{\mu}{c}\frac{\partial}{\partial t}H &= 0 \\ rotH - \frac{\varepsilon}{c}\frac{\partial}{\partial t}H &= 0 \\ divE &= 0 \\ divH &= 0 \end{aligned} \tag{3}$$

Are equivalent to the Dirac-like equation [2]:

$$\left[\gamma.\nabla - \begin{pmatrix} \varepsilon 1 & 0 \\ 0 & \mu 1 \end{pmatrix}\frac{1}{c}\frac{\partial}{\partial t}\right]\Psi^{c1} = 1, \tag{4}$$

Where in the usual representation

$$\gamma = \begin{pmatrix} 0 & \sigma \\ \sigma & 0 \end{pmatrix}, \tag{5}$$

And σ are the well-known Pauli matrices.

A few plausible extensions of Maxwell-Dirac isomorphism

a. It is known that the original Maxwell equations were expressed in quaternion algebra, instead of vector language, so there is a kind of revival from time to time to recover the original quaternionic Maxwell equations. With the help of Gersten's decomposition method, we were able to derive Maxwell equations in Quaternion space starting from quaternionic Dirac equations.[4]

   We started with a basic assumption of quaternionic square root as follows [4]:

   $$k = \left(E_{qk} + i\vec{p}_{qk}\right)q_k \tag{6}$$

   Then we proceed with Gersten's decomposition method to re-derive Maxwell from quaternionic Dirac equation. This approach seems quite worthy for further investigations.

b. Further improvement may be expected, for example to alter slightly the Maxwell equations by using gradient magnetic field. This has been explored by Simulik recently[4], and he was able to prove the existence of longitudinal wave. More specifically, he considers the following set of equations:

$$\partial_0 \vec{E} - curl\vec{H} = -gradE^0, \quad (7)$$

$$\partial_0 \vec{H} - curl\vec{E} = -gradH^0, \quad (8)$$

$$div\vec{E} = -\partial_0 E^0,$$

(9)

$$div\vec{H} = -\partial_0 H^0. \quad (10)$$

Concluding remarks

The problem of the formal connection between electrodynamics and wave mechanics has attracted the attention of a number of authors, especially there are some existing proofs on Maxwell-Dirac isomorphism. Here the author reviews two derivations of Maxwell-Dirac isomorphism i.e. by Hans Sallhofer and Volodimir Simulik. A few plausible extensions are discussed too, for example the use of quaternion algebra and also an extension to include longitudinal wave.

This paper was inspired by an old question: Is there a consistent and realistic description of wave function, both classically and quantum mechanically?

It can be expected that the above discussions will shed some lights on such an old problem especially in the context of physical meaning of quantum wave function. This is reserved for further investigations.

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A Computer Algebra Solution of Ermakov Equation Corresponding to Diffusion Interpretation of Wave Mechanics

Victor Christianto, Florentin Smarandache

ABSTRACT

It has been long known that a year after Schrödinger published his equation, Madelung also published a hydrodynamics version of Schrödinger equation. Quantum diffusion is studied via dissipative Madelung hydrodynamics. Initially the wave packet spreads ballistically, than passes for an instant through normal diffusion and later tends asymptotically to a sub-diffusive law. In this paper we will review two different approaches, including Madelung hydrodynamics and also Bohm potential. Madelung formulation leads to diffusion interpretation, which after a generalization yields to Ermakov equation. Since Ermakov equation cannot be solved analytically, then we try to find out its solution with *Mathematica* package. It is our hope that these methods can be verified and compared with experimental data. But we admit that more researches are needed to fill all the missing details.

Keywords: quantum hydrodynamics, quantum diffusion, quantum-classical correspondence, Madelung equation, Ermakov equation, computer algebra solution.

1. Introduction

The Copenhagen interpretation of quantum mechanics is guilty for the quantum mystery and many strange phenomena such as the Schrödinger cat, parallel quantum and classical worlds, wave-particle duality, decoherence, collapsing wave function, etc.

The Copenhagen interpretation of QM was challenged not only by Schrödinger but also by a large group of physicists led by Albert Einstein who claimed that the quantum mechanical description of the physical reality cannot be considered complete, as shown in their famous EPR paper Einstein, Podolsky and Rosen. They concluded their derivations by stating that "*While we have thus shown that the wave function does not provide a complete description of the physical reality, we left open the question of whether or not such a description exists. We believe, however that such a theory is possible."* Einstein did not object to the probabilistic description of sub-atomic phenomena in quantum mechanics. However, he believed that this probabilistic representation was a technique used to overcome the practical difficulties of dealing with a more complicated underlying physical reality, much in the same way he suggested earlier to deal with Brownian motion.

Many scientists have tried, however, to put the quantum mechanics back on *ontological* foundations. For instance, Bohm proposed an alternative interpretation of quantum mechanics, which is able to overcome some puzzles of the Copenhagen interpretation. He developed further the de Broglie pilot-wave theory and, for this reason, the Bohmian mechanics is also known as the de Broglie-Bohm theory.[2]

Long before the Bohmian mechanics proposal, a year after Erwin Schrödinger published his celebrated equation, Erwin Madelung showed (in 1927) that it can be written in a

hydrodynamic form. Madelung's representation has a seemingly major disadvantage by transforming the linear Schrödinger equation into two nonlinear ones. Nonetheless, despite of its additional complexity, the hydrodynamic analogy provides important insights with regard to the Schrödinger equation.

Quantum diffusion is studied via dissipative Madelung hydrodynamics. Initially the wave packet spreads ballistically, than passes for an instant through normal diffusion and later tends asymptotically to a sub-diffusive law.

Quantum diffusion (QD) describes a wave packet spreading in a dissipative environment at zero temperature. Since quantum effects are significant for light particles mainly, QD is very essential for electrons, which on the other hand are very important in physics and chemistry. QD has been experimentally observed, however, for muons as well, which are about 200 times heavier than electrons. Studies on electron transport in solids are strongly motivated by the semiconductor industry, exploring nowadays quantum effects on nano-scale.[4]

Another important transport process affected by quantum effects is the diffusion of hydrogen atoms or molecules in metals and on solid surfaces. The quantum tunneling accelerates the hydrogen diffusion, which is essential for many modern technologies for storage and use of hydrogen as a fuel, chemical reagent, etc.[4]

In this paper we will review two different approaches, including Madelung hydro-dynamics and also Bohm potential. It can be shown that Madelung formulation leads to diffusion interpretation, which after a generalization yields to Ermakov equation. Since Ermakov equation cannot be solved analytically, then we try to find out its solution with *Mathematica* package. It is our hope that these methods can be verified and compared

with experimental data. For other papers discussing the use of Ermakov equation in QM, see [8]-[12].

Nonetheless, we admit that more researches are needed to fill all the missing details, for example we do not yet discuss comparison between quantum trajectories and classical trajectories such as in Wilson chamber experiments.

2. Bohmian quantum potential [2]

The evolution of the wave function of a quantum mechanical system consisting of N particles is supposed to be described by the Schrödinger equation:

$$i\hbar\partial_t\psi = \left(-\frac{\hbar^2}{2m}\nabla + U\right)\psi. \tag{1}$$

The complex wave function can be presented generally in the polar form:

$$\psi = \sqrt{\rho}\exp\left(\frac{iS}{h}\right), \tag{2}$$

Where $\rho = |\psi|^2$ is the N-particles distribution density and $\frac{S}{\hbar}$ is the wave function phase.

Introducing equation (2) into (1) one gets a set of equations:

$$\partial_t\rho = -\nabla.(\rho\nabla S/m), \tag{3}$$

$$\partial_t S + \frac{(\nabla S)^2}{2m} + U + Q = 0, \tag{4}$$

Where quantum potential, Q, is defined as follows:

$$Q = -\frac{\hbar^2}{2m^2}\frac{\nabla^2\sqrt{\rho}}{\sqrt{\rho}}. \tag{5}$$

Equation (5) is called Bohmian quantum potential.[2]

3. Madelung quantum potential[2]

If one starts with a different assumption that in equation (3) S is the hydrodynamic-like velocity potential, not the mechanical action as suggested by Bohm, then he can arrives at different relations, such as the two equations proposed by Madelung as follows:

$$\partial_t \rho = -\nabla.(\rho V), \tag{6}$$

$$m\partial V + mV \cdot \nabla V = -\nabla(U + Q), \tag{7}$$

Where

$$V = \nabla S / m. \tag{8}$$

Equations (6) and (7) are known as the Madelung quantum hydrodynamics.[2]

4. Quantum Diffusion and Ermakov equation. Numerical solution

Quantum diffusion is studied via dissipative Madelung hydrodynamics. Initially the wave packet spreads ballistically, than passes for an instant through normal diffusion and later tends asymptotically to a sub-diffusive law.

Now, we start with Madelung equations (6)(7)(8), then introducing now both expressions for ρ and V in Eq. (7) yields the following equation:[4]

$$m\partial_t^2 \sigma + b\partial_t \sigma = \frac{\hbar^2}{4m\sigma^3},$$

(9)

describing the evolution of the root-mean-square displacement σ. Introducing new dimensionless dispersion and time parameters, Eq. (9) acquires the universal form of a dissipative Ermakov equation:

$$\partial_\tau^2 \xi + \partial_\tau \xi = \xi^{-3}, \tag{10}$$

where

$$\xi^2 \equiv \frac{2b\sigma^2}{\hbar}$$

(11)

$$\tau = bt/m.$$

(12)

It is known that such an Ermakov equation cannot be solved analytically. In reference [4], solutions have been obtained for some limiting cases. Now we will try to find numerical solution using *Mathematica* package using NDSolve, as follows:

```
ODE=x''[t]+x'[t]-1/x[t]^3==0;
sol=NDSolve[{ODE,x[0]==1,x'[0]==1},x[t],{t,-10,10}]
Plot[x[t]/.sol,{t,-10,10}]
```

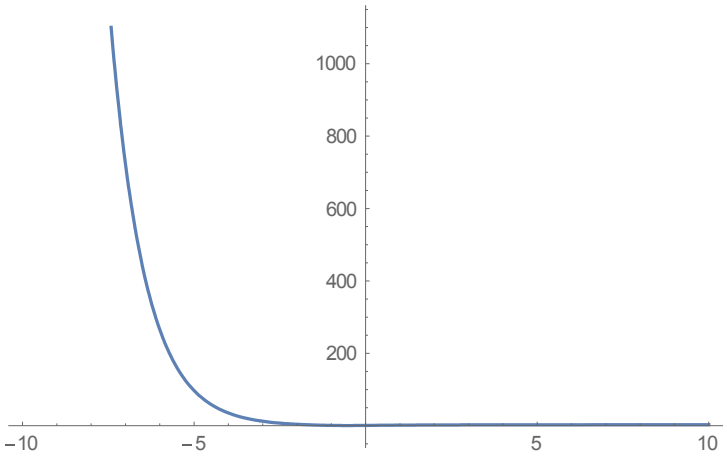

Figure 1. Plot for numerical solution of Ermakov equation

5. Discussion and Concluding Remarks

We have discussed two different approaches, including Madelung hydrodynamics and also Bohm potential. Madelung formulation leads to diffusion interpretation, which after a generalization yields to Ermakov equation. Since Ermakov equation cannot be solved analytically, then we try to find out its solution with *Mathematica* package.

We have obtained numerical solution of Ermakov equation corresponding to diffusion interpretation of QM. For other papers discussing the use of Ermakov equation in QM, see [8]-[12].

It is our hope that these methods can be verified and compared with experimental data. Nonetheless, we admit that more researches are needed to fill all the missing details, for example we do not yet discuss comparison between quantum trajectories and classical trajectories such as in Wilson chamber experiments.

Acknowledgement

The first author (VC) would express his sincere gratitude to Jesus Christ, He is the Logos, the true Savior of the Universe and all creations, and He is the Good Shepherd.

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On Plausible Role of Classical Electromagnetic Theory and Submicroscopic Physics to understand and enhance Low Energy Nuclear Reaction (LENR): A Preliminary Review

Victor Christianto, Yunita Umniyati, Volodymyr Krasnoholovets

Abstract

In this paper we will discuss how we can study some effects associated with LENR from the principles of classical electromagnetic theory and also from a very new approach based on the submicroscopic concept of physics. Perhaps our considerations have their own risks because the majority of mainstream physicists consider nuclear fusion rather as a phenomenon associated with tunneling through a Coulomb barrier, which is a pure quantum effect. We will discuss that there are some aspects of Classical electromagnetic theories which may have impact on our understanding on LENR phenomena, including: a. nonlinear electrostatic potential as proposed by Eugen Andreev, b. vortex sound theory of Tsutomu Kambe, c. nonlinear ponderomotive force, and d. submicroscopic consideration.

Introduction

Since Pons & Fleischmann reported their experiments around 1989, many labs in the world tried to replicate their results, but many failed. Thereafter, there was a wave of rejection to their claim that table-top nuclear fusion at room temperature is possible. Some establishment physicists even called “cold fusion” idea as *pathological science*. But many non-mainstream physicists and chemists continued their works in underground manner. And some eminent physicists have taken risks to join this underground movement, including Prof. Hagelstein from MIT.

But the rejection of mainstream physics towards cold fusion/LENR remain strong. Even the famous Prof. Brian Josephson from Cavendish Lab in Cambridge University was denied access from arXiv server because of his endorsement to E. Storm's works. He went on to write a paper suggesting that such a denial of many successful experiments related to cold fusion/LENR can be called "*pathological disbelief*."

In this context, allow us to recall a story that was told to the first author (VC) several times by Dr. Iwan Kurniawan, a nuclear engineer from Indonesia.[1] When he was a doctoral student in a University in Japan around 1990s, his professor invited him to do experiment related to cold fusion in physics lab. After setting all the apparatus properly, they went home. In the morning, they were surprised that all the apparatus was blown up and it damaged the window glasses in lab. Dr. Iwan told VC that since then he concluded that cold fusion does not work as claimed by Pons & Fleischmann.

He is one of my good friends for a long time, and VC and him often discussed many things. But regarding his cold fusion experiment in lab, we got a different opinion: the fact that the apparatus blew the entire lab indicates that there was huge energy in the device, so huge that it damaged the window glasses. The problems appear to come from at least two aspects: a. poorly understood mechanism of the reaction, and b. the reactor failed to work properly. So, it is basically similar to reactor meltdown in a usual fission reactor. We need to learn what makes their cold fusion reactor failed. It is not because there is no energy inside the system, but it is really because there is so huge energy. Reactor shutdown has recently been admitted as one of the real problems in many LENR reactors, and this is a challenge for experimenters and companies who want to design commercial LENR reactors.[8-10]

However, in this paper we will not repeat such debates that have been discussed many times elsewhere. Instead we will discuss how we can study some effects associated with LENR from the principles of classical electromagnetic theory. We are aware that this approach has its own risks, because many physicists consider that nuclear fusion should be associated with tunneling through Coulomb barrier, and this kind of tunneling is a pure quantum effect. Is that true?

We will discuss that there are some aspects of Classical electromagnetic theories which may have impact on our understanding on LENR phenomena, including: a. nonlinear electrostatic potential as proposed by Eugen Andreev, b. vortex sound theory of Tsutomu Kambe, c. nonlinear ponderomotive force, d. submicrosopic consideration. Regarding ponderomotive force, it has been proposed recently by Lundin & Lidgren in order to understand the mechanism of LENR. [13][14]

It is our hope that this paper will motivate young electrical engineers to study LENR phenomena from new perspectives starting from classical electromagnetics theories. In

[1] Special thanks to Dr. Iwan Kurniawan for telling his first-hand experiment with cold fusion. Wishing you will be recovered soon, brother!

short, classical electromagnetic theories still offer many surprises to those who are willing to dig deeper into the hidden mysteries of Nature.

a. Nonlinear electrostatic potential of Eugen Andreev

In modern physics, there is a firm conviction based on the vast empirical material that:

- The electromagnetic and nuclear interactions are of a different nature;
- The field of electric charge (proton, electron) is spherically symmetric;
- The nucleon-nucleon forces depend on the direction.

In his paper, Andreev [1] suggested a hypothesis that the notion of the nuclear interaction could be interpreted as a nonlinear distribution of the electrostatic potential, which manifests itself at the Fermi scale. An analytical form of the potential of the proton is proposed, which coincides with conventional forms used in the nuclear physics at a short scale, but becomes the usual Coulomb potential at a large scale.

The model potential possesses a set of properties that could be called "*nuclear van der Waals forces*."

Coulomb's law can be written in integral form as follows:[1]

$$\varphi(x,y,z) = \frac{k\varphi}{R} = -k\iiint_{v} \frac{div(\nabla\varphi(x,y,z))dV}{\sqrt{(x^2+y^2+z^2)}} \tag{1}$$

If we replace R with R_{dd}, which is defined as follows:

$$R_{dd} = \sqrt{x^2+y^2+\beta^2 z^2+{r_o}^2} \tag{2}$$

Then we will have a two parameter field potential: [1]

$$\phi(x,y,x,\beta,r_0) = \frac{\phi}{R+r_0}, \tag{3}$$

Or

$$\phi(x,y,z,\beta,r_0) = [\varphi].\left(\frac{k_1}{R_{dd}} + \frac{k_2}{|R_{dd}|^2}\right) \tag{4}$$

As a result, we have obtained an explicit analytic form of the *electronuclea*r potential of a proton:[1]

$$\phi_{(proton)} = \frac{r_0}{\sqrt{(x^2+y^2+2z^2+r_o^2)}} + \frac{dz.r_0^2}{(x^2+y^2+2z^2+r_o^2)} \tag{5}$$

Thus, the general form of the potential well, due to the specific distribution of the charge density inside the proton, reminds us to the *van der Waals interaction*.

The above result is quite significant, because it explained Coulomb barrier suppression starting from classical electromagnetics theory. Furthermore, Andreev has shown that PP potential as described above can be compared with:[1]

- Lennard-Jones potential (resulting from the van der Waals interaction):

$$V_{LJ} = \frac{0.01}{r^{12}} - \frac{1}{r^{5}} \tag{6}$$

- Reed potential:

$$V_{\mathrm{Re}ed} = -10\frac{e^{-r}}{r} - 1650\frac{e^{-4r}}{r} + 6484\frac{e^{-7r}}{r} \tag{7}$$

b. Vortex sound theory of Tsutomu Kambe [2][3][4]

The above electronuclear potential starts with electrostatics/Maxwell equations. Now it is very interesting to remark here that Prof. T. Kambe from University of Tokyo has made connection between equation of vortex sound and fluid Maxwell equations.

He wrote that it would be no exaggeration to say that any vortex motion excites acoustic waves.

He considers the equation of vortex sound of the form: [2]

$$\frac{1}{c}\partial_t^2 p - \nabla^2 p = \rho_0 \nabla . L = \rho_0 div(\omega \times v) \tag{8}$$

He also wrote that dipolar emission by the vortex-body interaction is:[3]

$$p(x,t) = -\frac{P_0}{4\pi c}\pi_i(t - \frac{x}{c})\frac{x_c}{x^2} \tag{9}$$

Then he obtained an expression of fluid Maxwell equations as follows:

$$\begin{aligned} &\nabla \cdot H = 0 \\ &\nabla \cdot E = q \\ &\nabla \times E + \partial_t H = 0 \\ &a_0^2 \nabla \times H - \partial_t E = J \end{aligned} \tag{10}$$

Where :

a_0 denotes the sound speed, and

$$q = -\partial_t(\nabla \cdot u) - \nabla \hbar,$$
$$J = \partial_t^2 v + \nabla \partial_t h + a_o^2 \nabla \times (\nabla \times v) \tag{11}$$

To our opinion, this new expression of fluid Maxwell equations suggests that there is deep connection between vortex sound and electromagnetic fields. Therefore, it may offer new ways to alter the form of electronuclear potential as described in the previous section.

For octonic formulation of fluid Maxwell equations, see [15]. For alternative hydrodynamics expression of electromagnetic fields, see [16].

c. Nonlinear ponderomotive force

According to Brechet et al. [6], a ponderomotive force results from the response of inhomogeneous matter fields to the presence of electromagnetic fields. Ponderomotive forces are generally overlooked since the electromagnetic community is not much concerned with continuum mechanics and the continuum mechanics community is not dealing usually with electromagnetic systems.

The nonrelativistic ponderomotive force as proposed by Miller (1958) is as follows: [7]

$$F = m\ddot{\vec{r}} = -\frac{q^2}{4m\omega^2}\nabla\left|\vec{E}(r,t)\right|^2 \tag{12}$$

Equation (12) can obviously be derived from the ponderomotive potential:

$$\phi_{(p)}(r,t) = \frac{q^2}{4m\omega^2}\left|\vec{E}(r,t)\right|^2 \tag{13}$$

Other than Miller's force, there are other types of ponderomotive forces ee: [5]

- Abraham force (1903),
- Barlow (1958),
- Lundin & Hultqvist (1989),
- Bolotovsky & Serov (2003).

It can be noted here that the Miller force is independent of wave frequency for $\omega^2 << \Omega^2$ and **attractive** for the entire frequency range below resonance. The Miller force is **repulsive** at frequencies above resonance, but decays strongly at higher frequencies.

Ponderomotive forcing by electromagnetic waves is capable of causing attraction of solid bodies.

Brechet et al. [6] discuss electromagnetic force density of magnetoelectric ponderomotive force, which is different from Miller's force.

In a recent paper, Lundin & Lidgren proposed that Miller ponderomotive force may offer an explanation to nuclear spallation as observed in some LENR experiments. Although their study is not yet conclusive, it opens an entirely new way to discuss LENR from purely classical electromagnetic theory.

d. Submicroscopic consideration

In monograph [11] it was presented a detailed structure of physical space (or a vacuum, ether), which is based on pure mathematical principles – set theory, topology and fractal geometry. The study shows that matter appears from a primary substrate that has a structure of a mathematical lattice named the tessellattice. Thus all massive particles as well as electrically charged particles emerge from the tessellattice as local distortions of its cells. At the motion such anamorphosis has to interact with the tessellattice, which is neglected in quantum mechanical, quantum field and electromagnetic theories. The bulk fractal deformation of a cell of the tessellattice is associated with the notion of mass; thought the surface deformation of a cell is related to the electric charge. Hence two kinds of equations should appear: one system of equations describes the behavior of a massive particle and one more system of equations depicts the behavior of the electric charge. The first system is quite new and presented in book [11] and it is related to the quantum mechanical formalism; the other system is reduced to the conventional Maxwell equations, which is also illustrated in book [11].

It has been demonstrated [11] that the interaction of a moving particle with the tessellattice results in the generation of a new kind of quasi-particles named 'inertons'. These inertons are carriers of massive properties of particles and they play in some sense the role of hidden variables introduced in physics by de Broglie, Bohm and Vigier. Inertons exchange by mass, speed and hence momentum and kinetic energy with the particle that generates them. A section of space known as the particle's de Broglie wavelength λ is the spatial amplitude of the particle. it is a section, in which the particle initially generates inertons and passing the whole kinetic energy to the generated cloud of inertons finally stops; then in the next section λ inertons guide the particle passing on to it their velocity, mass, momentum and kinetic energy.

The particle's inerton cloud together with the particle, which exist in the real space, are projected to the quantum mechanical formalism, which was developed in a phase space, as the particle's wave ψ-function. Thus, in a solid each atom is surrounded with its inerton cloud; the same for each free electron, proton or another canonical particle.

In the recent experiment [12] in a chamber filled with a gas a discharge has been generated. Positive ions of the gas reached the cathode where they interacted with atoms of the electrode made of tungsten. If the gas is hydrogen, discharges produce free protons in it. Reaching the cathode, protons interact with a metal matrix in such a way, that at the resonance conditions, i.e. when the momenta of the interacting atom and proton are coincide by the absolute value and have opposite directions, i.e. the proton impacts the

tungsten atom being in antiphase oscillating in its site of the crystal lattice, both particles must stop, $m_{\rm p}\vec{u}_{\rm p} + m_{\rm W}\vec{u}_{\rm W} = 0$. This condition means that the proton knocks out the tungsten's atom inerton cloud.

One of free electrons available at the surface of the electrode absorbs the tungsten atom's inerton cloud and also traps a proton. The merging of the heavy electron with the proton results in the creation of a super heavy hydrogen atom. In this system the reduced mass of the proton and the electron is almost equal to $m_{\rm p}$ (in fact $1/m_{\rm p} + 1/(m_{\rm e} + m_{\rm W}) \cong 1/m_{\rm p}$). Therefore the proton starts to rotate around the heavy electron; the Bohr radius for the rotating proton is

$$r_{\text{p-e}} = \frac{4p\varepsilon_0\hbar^2 n^2}{e^2 m_{\rm p}} = 2.88\text{´}\ 10^{-14}\ \text{m}, \tag{14}$$

where we put $n = 1$. Though the electron orbit (14) deeply penetrates into the middle of the proton, the electron still does not reach the critical distance of 2×10^{-14} m that characterizes the quark orbit inside the proton [11]. If we put $n = 2,\ 3$, the radius (14) will be larger but still in the order of femtometers.

What is interesting, these small atoms named subatoms [12] behave like neutrons, namely, neutron detectors measured the presence of neutrons in the experiment conducted. We [12] were able to generate subatoms, such as subhydrogen and subhelium (in a helium atmosphere), which were perceived by the neutron detector as real neutrons. The intensity of the measured "neutron" radiation was rather significant; the maximum value measured by the detector was 3×10^5 neutrons/(cm^2·min). Nevertheless, the real intensity could even be 5 orders higher. Besides, analyzing our experiments, we came to the conclusion about the existence of other tiny systems: subdeuterium, neutral {deuteron + subhydrogen} pair, and neutral {deuteron + subhelium} pair.

Many other researchers reported about similar very small stable atoms, or combined particles, though were unable to explain their structure and properties.

All these nuclear systems had the size around several units of 10^{-14} nm. They can be generated artificially in a chamber filled with a gas. When in the chamber a discharge is generated, positive ions of the gas reaches the cathode where they interact with atoms of the electrode, typically made of tungsten.

When we launch the production of subatoms and the mentioned nuclear pairs, at the high intensity of these entities we are able to anticipate the real transformation of nuclei in the system studied. Indeed, tiny subatoms and nuclear pairs (with the size $\le 5\cdot10^{-14}$ m) can easy to penetrate a shell of electrons around each atom, which have a size around 10^{-10} m.

In other words, a subatom or nuclear pair moving to the nucleus of the atom studied will pierce the electron shell similarly to a spaceship that is travelling in our solar system. Any electron of the electron shell cannot experience this pinhole because of the incommensurability of the sizes of tiny particles and electron orbits.

Approaching a nucleus, a subatom or nuclear par starts interacting with nuclides: a subatom brings to the nucleus a thermal proton (deuteron or α particle), the inerton cloud and electron. The electron will be getting away from the nucleus because it does not participate in nuclear reactions. But the proton (deuteron or α particle) will bring an additional interaction inside the nucleus, which has to result in its mutation.

In fact, studying samples of iron and samples of water contaminated with Cesium-137 we [11] revealed significant mutations in iron (in which emerged such elements, as Co, Ni, Ca, Hf, Cs) and decrease in radioactivity of the water sample up to 30-40% at the application of an inerton field. It seems in those experiments initially subatoms had formed that then influenced nuclei of Fe (in samples of iron) and nuclei of Cs-137 (in samples of water contaminated with radioactive cesium).

Discussion & Concluding Remarks

We have discussed a new expression of electronuclear potential starting from electrostatics law. This explains Coulomb barrier suppression from purely classical origin, without the use of nuclear potential such as Woods-Saxon potential. The model potential possesses a set of properties that could be called "*nuclear van der Waals forces*." In our opinion, this is a quite surprising result that offers a novel way to explain low energy nuclear reaction (LENR) from Classical Electromagnetic theories.

Moreover, Kambe's new expression of fluid Maxwell equations suggests that there is deep connection between vortex sound and electromagnetic fields. Therefore, this result may offer a new insight on how to alter the electronuclear potential using vortex sound equation. This requires further investigations.

In a recent paper, Lundin & Lidgren proposed that Miller ponderomotive force might offer an explanation to nuclear spallation as observed in LENR experiments. Although their study is not yet conclusive, it opens an entirely new way to discuss LENR from purely classical electromagnetic theories.

The electrostatic/electronuclear potentials, fluid Maxwell equations and ponderomotive force have been proposed as an alternative to tunneling effects that could occur at a quantum mechanical consideration of LENR. However, in section d we have shown that the tunneling effect itself can be considered in deeper terms, namely from the submicroscopic point view. This is a quite new approach to the description of physical phenomena, which however, promise a lot in both our understanding of mysterious phenomena of nature and the modeling of some crucial experiments, such LENR or similar.

As follows from the submicroscopic concept, LENR can be possible only in the case when subatoms or nuclear pairs emerge in the system studied. An efficiency of LENR is directly proportional to the quantity of generated subatoms and nuclear pairs. That is why it seems to reach the highest efficiency in LENR can be possible at the following two main conditions: (i) in a reaction chamber one has to increase the number of subatoms and nuclear pairs to the value of no less than 10^{12}; at this quantity of deuterons in a macroscopic sample reactions $d + d$ = He produces heat comparative to a room temperature; (ii) there should be invented a mechanism(s) that would stimulate collisions of subatoms and nuclear pairs with potential targets and between themselves.

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Dispelling the Myth Surrounding Maxwell's Displacement Current, and Its Applications in Triboelectric Nanogenerators for Energy Harvesting

Victor Christianto, Florentin Smarandache

Abstract

In recent years, there are growing number of proposals to use a novel concept of energy harvesting using nanogenerators. This concept can be used for water wave energy harvesting, wind energy harvesting, but also for self-powered microdevices. This novel concept is based on the reality of Maxwell's displacement current. On the other hand, such a displacement current has been debated for many years: whether it is real or just a mathematical entity. This paper is intended to dispelling the myth surrounding the reality and correct interpretation of displacement current based on on Maxwell's electromagnetic theory. We also briefly discuss a plausible extension of Maxwell equations based on vortex sound theory of Prof. Tsutomu Kambe. It is our hope that discerning the myth from reality is very important step toward tapping and harvesting energy from the hidden electromagnetic structure in Nature.

Key Words: Maxwell electromagnetic theory, displacement current, piezoelectric nanogenerator, triboelectric nanogenerator, vortex sound theory.

1. Introduction

In a series of recent papers, Wang discusses possible applications of a novel concept for energy harvesting called triboelectric nanogenerators. Self-powered system is a system that can sustainably operate without an external power supply for sensing, detection, data processing and data transmission. Nanogenerators were first developed for self-powered systems based on piezoelectric effect and triboelectrification effect for converting tiny mechanical energy into electricity, which have applications in internet of things, environmental/infrastructural monitoring, medical science and security. In this paper, we present the fundamental reasoning of the nanogenerators starting from the Maxwell equations.[1]

In the Maxwell's displacement current, the first term gives the birth of electromagnetic wave, which is the foundation of wireless communication, radar and later the information technology. Our study indicates that the second term in the Maxwell's displacement current is directly related to the output electric current of the nanogenerator, meaning that our nanogenerators are the applications of Maxwell's displacement current in energy and sensors. By contrast,

electromagnetic generators are built based on Lorentz force driven flow of free electrons in a conductor.[2]
This paper is intended to dispelling the myth surrounding the reality and correct interpretation of Maxwell's original electromagnetic theory. It is our hope that discerning the myth from reality is very important step toward tapping the hidden electromagnetic structure in Nature.

2. Several different interpretations of Maxwell's displacement current

Our discussion starts from the fundamental Maxwell's equations that unify electromagnetism[2]:

$$\begin{aligned}
&\nabla \cdot B = 0(MagneticGauss),\\
&\nabla \cdot D = \rho_f\,(Gauss),\\
&\nabla \times E + \partial_t B = 0(Faraday),\\
&\nabla \times H - \partial_t D = J_f\,(Amperecircuitallaw),
\end{aligned} \tag{1}$$

Where the electric field E; the magnetic field B; magnetizing field H; the free electric charge density ρ_f; the free electric current density J_f; displacement field D,

$$D = \varepsilon_o E + P. \tag{2}$$

In fourth equation of (1), the second term in l.h.s. of the equation is the Maxwell's displacement current defined as

$$J_D = \partial_t D = \varepsilon_0 \frac{\partial E}{\partial t} + \frac{\partial P}{\partial t}. \tag{3}$$

The displacement current was first postulated by Maxwell in 1861 [1], and it was introduced on consistency consideration between Ampere's law for the magnetic field and the continuity equation for electric charges. The displacement current is not an electric current of moving free charges, but a time-varying electric field (vacuum or media), plus a contribution from the slight motion of charges bound in atoms, dielectric polarization in materials. In Eq. (3), the first component in the displacement current gives the birth of electromagnetic wave, which later being taken as the approach for developing radio, radar, TV and long distance wireless communication.
It can be shown that there is relationship between the second term in the displacement current and the output signal from nanogenerators, and show the contribution of displacement current to energy and sensors in the near future. [2]

In this paper, we briefly mention two applications of displacement current:[2]
(1) Piezoelectric nanogenerator, where the displacement current from the media polarization is:

$$J_{Di} = \frac{\partial P_i}{\partial t} = (e)_{ijk}\left(\frac{\partial s}{\partial t}\right)_{jk}.$$

(4)
(2) Triboelectric nanogenerator, where the displacement current can be expressed as:

$$J_D = \frac{\partial D_z}{\partial t} = \frac{\partial \sigma_I(z,t)}{\partial t} = \sigma_c \frac{dz}{dt}\frac{d_1\varepsilon_0/\varepsilon_1 + d_2\varepsilon_0/\varepsilon_2}{\left(d_1\varepsilon_0/\varepsilon_1 + d_2\varepsilon_0/\varepsilon_2 + z\right)^2}. \quad (5)$$

Nonetheless, it is known for experts in classical electromagnetic theory, that there are various opinions concerning the meaning and physical reality of equation (3). For experts, see for instance Marco Landini [4], Jackson [5], and Selvan [7]. Here we will only cite some remarks by Tombe [6], as follows:

a. *Maxwell's original approach*: Maxwell conceived the idea of displacement current in connection with elasticity. He had proposed a sea of molecular vortices to explain electromagnetic phenomena, and those vortices were surrounded by electric particles that acted as idle wheels. His views on displacement current can be read in the introduction to part III of his 1861 paper 'On Physical Lines of Force' (beginning at page 39 in the pdf file) at [1]. Maxwell was never satisfied that his molecular vortex model represented a totally accurate picture, and so his attempt to explain the detailed physical significance of displacement current in relation to the rotational aspect of his molecular vortices was somewhat vague. He seemed to be saying that the force involved in displacement current is a tangential force which alters the state of angular momentum of the vortices, and that electromagnetic radiation is therefore a propagation of fine-grained angular acceleration. The angular momentum H would therefore be at right angles and in phase with the tangential force E. Maxwell added displacement current to Ampère's Circuital Law in order to make it applicable to 'Total Current', but it is clear that he did not intend the applicability of this modified version of Ampère's Circuital Law to be restricted to the vicinity of electric current circuits. His follow up work indicates that he intended it to apply anywhere where electromagnetic radiation exists. There seems to be a popular idea circulating around that Maxwell conceived of displacement current in conjunction with the electric capacitor circuit, but this idea is not found in his original papers. [6]
b. *The Modern Textbook Approach:* The modern textbook approach to displacement current is quite different to Maxwell's approach. It is based on the idea that Ampère's Circuital Law needs to be modified in order to comply with situations, such as that which arises in the capacitor circuit, in which charge density is varying with time. Displacement current is then added to one side of Ampère's Circuital Law as an additional term, but it is added on the basis that it is not a real current. The fact that modern displacement is not a real current means that the Ampère's Circuital Law equation has been unbalanced by virtue of

adding a new term to one side only. This approach however creates two problems. First of all, the justification for unbalancing the equation is based on the philosophy that the end justifies the means. That is a highly dubious approach when it comes to interfering with equations that have already been derived in the state that they are in. A closer look at the situation further shows that the additional term does not address the issue which it is said to be addressing.[6]

c. *The Polarization approach:* A current flows in a capacitor circuit. This in turn causes a linear polarization of the dielectric between the capacitor plates which blocks the current flow. Linear polarization is a self restoring elastic effect and it is roughly what Maxwell had in mind for displacement current. Maxwell considered displacement current to differ from free current in that the elasticity of the medium would cause the displacement current to grind to a halt. However, as regards electromagnetic radiation, the displacement in question would have to be an angular displacement as opposed to a linear displacement. And in that regard it is interesting to note that Maxwell's concept of polarization was not the straightforward linear effect that we have in mind. In part III of Maxwell's 1861 paper, he says "I conceived the rotating matter to be the substance of certain cells, divided from each other by cell-walls composed of particles which are very small compared with the cells, and that it is by the motions of these particles, and their tangential action on the substance in the cells, that the rotation is communicated from one cell to another." [1]

To conclude this matter, again allow us to cite Tombe [6]:

> "The modern day displacement current is a highly dubious virtual concept, and it bears no connection to what Maxwell had in mind. Conservation of charge in a capacitor circuit is not an issue which is in anyway addressed by displacement current. Conservation of charge is a hydrodynamical issue that is catered for by Bernoulli's Principle whereby voltage and charge represent pressure and current represents velocity. Charge variation with time is not a matter which is catered for in any respect within the realm of Ampère's Circuital Law. If we wish to add a displacement current term to Ampère's Circuital Law then we must justify it in terms of real current just as Maxwell did."

It appears to us that the only way to figure out the reality of Maxwell's displacement current is either to measure it with capacitor [8], or use it for nanogenerators [2]. In other words, it seems possible that future nanogenerators will expose the hidden reality behind displacement current, or may be a new term needs to be added.

3. A plausible extension of Maxwell's displacement current

There are a number of proposals to revise Maxwell equations. But few has considered a fresh starting point with regards to the structure of aether. It is very interesting to note that Prof. T. Kambe from University of Tokyo has made a connection between the equation of vortex sound

and fluid Maxwell equations. He wrote that it would be no exaggeration to say that any vortex motion excites *acoustic* waves. [3]

He considers the equation of vortex sound of the form: [3]

$$\frac{1}{c^2}\partial_t^2 p - \nabla^2 p = \rho_0 \nabla.L = \rho_0 div(\omega \times v) \tag{8}$$

He also wrote that dipolar emission by the vortex-body interaction is:[3]

$$p_F(x,t) = -\frac{P_0}{4\pi c}\dot{\Pi}_i(t - \frac{x}{c})\frac{x_c}{x^2} \tag{9}$$

Then he obtained an expression of fluid Maxwell equations as follows [3]:

$$\begin{aligned} &\nabla \cdot H = 0 \\ &\nabla \cdot E = q \\ &\nabla \times E + \partial_t H = 0 \\ &a_0^2 \nabla \times H - \partial_t E = J \end{aligned} \tag{10}$$

Where [4]:

a_0 denotes the sound speed, and

$$\begin{aligned} &q = -\partial_t(\nabla \cdot \upsilon) - \nabla \hbar, \\ &J = \partial_t^2 v + \nabla \partial_t h + a_o^2 \nabla \times (\nabla \times \upsilon) \end{aligned} \tag{11}$$

In our opinion, this new expression of fluid Maxwell equations suggests that there is a deep connection between vortex sound and electromagnetic fields. Therefore, it may offer new ways to *alter* the form of electronuclear potential as described in the previous section.

However, it should be noted that the above expressions based on fluid dynamics need to be verified with experiments. We should note also that in (10) and (11), the speed of sound a_0 is analogous of the speed of light in Maxwell equations, whereas in equation (8), the speed of sound is designated "c" (as analogous to the light speed in EM wave equation).

It is our hope that such a new interpretation and modification of Maxwell equations based on vortex sound will lead to further development in nanogenerators technology.

As an added note, we can mention here that elsewhere Wang [9] was able to derive Coulomb law from the source-sink approach. We are wondering if it is also possible to rederive Maxwell equations including displacement current from the same approach. If yes, then it may offer another fresh starting point to understand the physical meaning of displacement current.

4. Concluding remarks

In recent years, there are growing number of proposals to use a novel concept of energy harvesting using nanogenerators. This concept can be used for water wave energy harvesting, wind energy harvesting, but also for self-powered microdevices. This novel concept is based on the reality of Maxwell's displacement current. On the other hand, such a displacement current has been debated for many years: whether it is real or just a mathematical entity. This paper is intended to dispelling the myth surrounding the reality and correct interpretation of displacement current based on on Maxwell's electromagnetic theory. We also briefly discuss a plausible extension of Maxwell equations based on vortex sound theory of Prof. Tsutomu Kambe. It is our hope that discerning the myth from reality is very important step toward tapping and harvesting energy from the hidden electromagnetic structure in Nature.

Acknowledgment: The first author (VC) also would like to express his gratitude to Jesus Christ who always encouraged and empowered him in many occasions. He is the Good Shepherd. *Soli Deo Gloria!*

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London-Proca-Hirsch Equations for Electrodynamics of Superconductors on Cantor Sets

Victor Christianto

Abstract

In a recent paper published at *Advances in High Energy Physics* (AHEP) journal, Yang Zhao *et al*. derived Maxwell equations on Cantor sets from the local fractional vector calculus. It can be shown that Maxwell equations on Cantor sets in a fractal bounded domain give efficiency and accuracy for describing the fractal electric and magnetic fields. However, so far there is no derivation of equations for electrodynamics of superconductor on Cantor sets. Therefore, in this paper I present for the first time a derivation of London-Proca-Hirsch equations on Cantor sets. The name of London-Proca-Hirsch is proposed because the equations were based on modifying Proca and London-Hirsch's theory of electrodynamics of superconductor. Considering that Proca equations may be used to explain electromagnetic effects in superconductor, I suggest that the proposed London-Proca-Hirsch equations on Cantor sets can describe electromagnetic of fractal superconductors. It is hoped that this paper may stimulate further investigations and experiments in particular for fractal superconductor. It may be expected to have some impact to fractal cosmology modeling too.

Key Words: Cantor sets, Hirsch theory, London equations, local fractional vector calculus, Maxwell equations, Proca equations, electrodynamics, superconductor.

1. Introduction

According to J.E. Hirsch, from the outset of superconductivity research it was assumed that no electrostatic fields could exist inside superconductors and this assumption was incorporated into conventional London electrodynamics.[2] Hirsch suggests that there are difficulties with the two London equations. To summarize, London's equations together with Maxwell's equations lead to unphysical predictions.[1] Hirsch also propose a new model for electrodynamics for superconductors. [1][2]

The present paper is intended to be a follow-up paper of our four recent papers: one paper reviews Shpenkov's interpretation of classical wave equation and its role to explain periodic table of elements and other phenomena [11], and the second one presents a derivation of

GravitoElectroMagnetic Proca equations in fractional space [12], the third one presents an outline of cosmology based on the concept of fractal vibrating string [13], and the fourth one presents a derivation of Proca equations on Cantor sets [14].

In this regard, in a recent paper Yang Zhao et al. derived Maxwell equations on Cantor sets from the local fractional vector calculus.[3] It can be shown that Maxwell equations on Cantor sets in a fractal bounded domain give efficiency and accuracy for describing the fractal electric and magnetic fields. However, so far there is no derivation of equations for electrodynamics of superconductor on Cantor sets. Therefore, in this paper I present for the first time a derivation of London-Proca-Hirsch equations on Cantor sets. The name of London-Proca-Hirsch is proposed because the equations were based on modifying London equations, Proca equations and Hirsch's theory of electrodynamics of superconductor.

Therefore the aim of the present paper is to propose a combined version of London-Proca-Hirsch model for electrodynamics of superconductor. Then I extend further this proposed model for electrodynamics of superconductor on Cantor sets. Considering that Proca equations may be used to explain electromagnetic effects in superconductor [4]-[8], I suggest that the proposed London-Proca-Hirsch equations on Cantor sets can describe electromagnetic of fractal superconductors. It is hoped that this paper may stimulate further investigations and experiments in particular for fractal superconductor. It may be expected to have some impact to fractal cosmology modeling too.

2. Hirsch's model to revise London's equations

According to J.E. Hirsch, from the outset of superconductivity research it was assumed that no electrostatic fields could exist inside superconductors and this assumption was incorporated into conventional London electrodynamics.[2] Hirsch suggests that there are

difficulties with the two London equations. Therefore he concludes that London's equations together with Maxwell's equations lead to *unphysical* predictions.[1] However he still uses four-vectors J and A according to Maxwell's equations:

$$\Box^2 A = -\frac{4\pi}{c} \quad , \tag{1}$$

And

$$J - J_0 = -\frac{c}{4\pi\lambda_L^2}(A - A). \tag{2}$$

Therefore Hirsch proposes a new fundamental equation for electrodynamics for superconductors as follows: [1]

$$\Box^2 (A - A_0) = \frac{1}{\lambda_L^2}(A - A), \tag{3a}$$

where

- London penetration depth λ_L is defined as follows:[2]

$$\frac{1}{\lambda_L^2} = \frac{4\pi n_s e^2}{m\, c}, \tag{3b}$$

- And d'Alembertian operator is defined as: [1]

$$\Box^2 = \nabla \ -\frac{1}{c^2}\frac{\partial^2}{\partial_t} \ . \tag{3c}$$

Then he proposes the following equations: [1]

$$\Box^2 (F - F_0) = \frac{1}{\lambda_L^2}(F - F), \tag{4}$$

And

$$\nabla^2(J - J_0) = \frac{1}{\lambda_L^2}(J - J\ ), \tag{5}$$

where F is the usual electromagnetic field tensor and F_0 is the field tensor with entries $\vec{E}_0$ and 0 from $\vec{E}$ and $\vec{B}$ respectively when expressed in the reference frame at rest with respect to the ions.

In the meantime, it is known that Proca equations can also be used to described electrodynamics of superconductors, see [4]-[8]. The difference between Proca and Maxwell equations is that Maxwell equations and Lagrangian are based on the hypothesis that the photon has zero mass, but the Proca's Lagrangian is obtained by adding mass term to Maxwell's Lagrangian.[17] Therefore, the Proca equation can be written as follows:[17]

$$\partial_\mu F^{\mu\nu} + m_\gamma{}^2 A_\nu = \frac{4\pi}{c} J^\nu, \tag{6a}$$

where $m_\gamma = \frac{\omega}{c}$ is the inverse of the Compton wavelength associated with photon mass. [17] In terms of the vector potentials, equation (6a) can be written as [17]:

$$(\nabla\ \ m_\gamma)A_\mu = \frac{4\pi}{c} J_\mu. \tag{6b}$$

Similarly, according to Kruglov [15] the Proca equation for a free particle processing the mass m can be written as follows:

$$\partial_\nu \varphi_{\mu\nu}(x) + m^2 \varphi_\mu(x) = 0, \tag{6}$$

Now, the similarity between equations (1) and (6b) are remarkable with exception that equation (1) is in quadratic form. Therefore I propose to consider a modified form of Hirsch's model as follows:

$$(\Box^2 - m_\gamma)(F - F_0) = \frac{1}{\lambda_L^2}(F - F\ ), \tag{8a}$$

And

$$(\Box^2 - m_\gamma)(J - J_0) = \frac{1}{\lambda_L^2}(J - J\ ). \tag{8b}$$

The relevance of the proposed new equations in lieu of (4)-(5) should be verified by experiments with superconductors [16]. For convenience, the equations (8a)-(8b) can be given a name: London-Proca-Hirsch equations.

3. A review of previous result - Maxwell equations on Cantor sets

I will not re-derive Maxwell equations here. For a good reference on Maxwell equations, see for example Julian Schwinger et al.'s book: *Classical Electrodynamics* [9].

Zhao et al. were able to write the local fractional differential forms of Maxwell equations on Cantor sets as follows [3, p.4-5]:

- Gauss's law for the fractal electric field: $\nabla^\alpha \cdot D = \rho$, (9)

- Ampere's law in the fractal magnetic field: $\nabla^\alpha \times H = J_a + \frac{\partial^\alpha D}{\partial t^\alpha}$, (10)

- Faraday's law in the fractal electric field: $\nabla^\alpha \times E = -\frac{\partial^\alpha B}{\partial t^\alpha}$, (11)

- magnetic Gauss's law in the fractal magnetic field: $\nabla^\alpha \cdot B = 0$, (12)

and the continuity equation can be defined as:

$$\nabla^\alpha \cdot J = -\frac{\partial^\alpha \rho}{\partial t^\alpha}, \tag{13}$$

where $\nabla^\alpha \cdot r$ and $\nabla^\alpha \times r$ are defined as follows:

2.1. In Cantor coordinates [10, p. 2]:

$$\nabla^\alpha \cdot u = div^\alpha u = \frac{\partial^\alpha u_1}{\partial x_1^\alpha} + \frac{\partial^\alpha u}{\partial x_2^\alpha} + \frac{\partial^\alpha u_3}{\partial x_3^\alpha}, \tag{14}$$

$$\nabla^\alpha \times u = curl^\alpha u = \left(\frac{\partial^\alpha u_3}{\partial x_2^\alpha} - \frac{\partial^\alpha u_2}{\partial x_3^\alpha} \right) e_1^\alpha + \left(\frac{\partial^\alpha u_1}{\partial x_3^\alpha} - \frac{\partial^\alpha u_3}{\partial x_1^\alpha} \right) e_2^\alpha + \left(\frac{\partial^\alpha u_2}{\partial x_1^\alpha} - \frac{\partial^\alpha u_1}{\partial x_2^\alpha} \right) e_3^\alpha . \tag{15}$$

2.2. In Cantor-type cylindrical coordinates [3, p.4]:

$$\nabla^\alpha \cdot r = \frac{\partial^\alpha r_R}{\partial R^\alpha} + \frac{1}{R^\alpha}\frac{\partial^\alpha r_\theta}{\partial \theta^\alpha} + \frac{r_R}{R^\alpha} + \frac{r_z}{\partial z^\alpha}, \tag{16}$$

$$\nabla^\alpha \times r = \left(\frac{1}{R^\alpha}\frac{\partial^\alpha r_\theta}{\partial \theta^\alpha} - \frac{\partial^\alpha r_\theta}{\partial z^\alpha} \right) e_R^\alpha + \left(\frac{\partial^\alpha r_R}{\partial z^\alpha} - \frac{\partial^\alpha r_z}{\partial R^\alpha} \right) e_\theta^\alpha + \left(\frac{\partial^\alpha r_\theta}{\partial R^\alpha} + \frac{r_R}{R^\alpha} - \frac{}{R^\alpha}\frac{\partial^\alpha r_R}{\partial \theta^\alpha} \right) e^\alpha . \tag{17}$$

3. London-Proca-Hirsch Equations on Cantor Sets

It can be shown that Proca equations can be derived from first principles [6], and also that Proca equations may have link with Klein-Gordon equation [7]. However, in this paper I will not attempt to re-derive Proca equations. Instead, I will use Proca equations as described in [6]. Then I will derive the London-Proca-Hirsch equations on Cantor Sets, in accordance with Zhao *et al.*'s approach as outlined above [3].

According to Blackledge, Proca equations can be written as follows [7]:

$$\nabla \cdot \vec{E} = \frac{\rho}{\varepsilon_0} - \kappa^2 \phi, \tag{18}$$

$$\nabla \cdot \vec{B} = 0, \tag{19}$$

$$\nabla \times \vec{E} = -\frac{\partial \vec{B}}{\partial t}, \tag{20}$$

$$\nabla \times \vec{B} = \mu_0 j + \varepsilon_0 \mu_0 \frac{\partial \vec{E}}{\partial t} + \kappa^2 \vec{A}, \tag{21}$$

where:

$$\nabla \phi = -\frac{\partial \vec{A}}{\partial t} - \vec{E}, \tag{22}$$

$$\vec{B} = \nabla \times \vec{A}, \tag{23}$$

$$\kappa = \frac{mc_0}{\hbar}. \tag{24}$$

Therefore, by using the definitions in equations (14)-(17), we can arrive at Proca equations on Cantor sets from (18) through (23), as follows:

$$\nabla^\alpha \cdot \vec{E} = \frac{\rho}{\varepsilon_0} - \kappa^2 \phi, \tag{25}$$

$$\nabla^\alpha \cdot \vec{B} = 0, \tag{26}$$

$$\nabla^\alpha \times \vec{E} = -\frac{\partial^\alpha \vec{B}}{\partial t^\alpha}, \tag{27}$$

$$\nabla^\alpha \times \vec{B} = \mu_0 j_a + \varepsilon_0 \mu_0 \frac{\partial^\alpha \vec{E}}{\partial t^\alpha} + \kappa^2 \vec{A}, \tag{28}$$

where:

$$\nabla^\alpha \phi = -\frac{\partial^\alpha \vec{A}}{\partial t^\alpha} - \vec{E}, \tag{29}$$

$$\vec{B} = \nabla^\alpha \times \vec{\ }, \tag{30}$$

and Del operator $\nabla^\alpha \phi$ can be defined as follows [10, p.2]:

$$\nabla^{\alpha}\phi = \frac{{}^{\alpha}\phi}{\partial {}^{\alpha}_{1}}\,{}^{\alpha}_{1} + \frac{\partial^{\alpha}\phi}{x_2^{\alpha}}e_2^{\alpha} + \frac{\partial^{\alpha}\phi}{{}^{\alpha}_{3}}\,{}^{\alpha}_{3}. \tag{31}$$

Since according to Blackledge, the Proca equations can be viewed as a *unified wavefield* model of electromagnetic phenomena [7], therefore we can also regard the Proca equations on Cantor sets as a further generalization of Blackledge's *unified wavefield* model.

Now, having defined Proca equations on Cantor Sets, we are ready to write down London-Proca-Hirsch on Cantor sets using the same definition, as follows:

$$(\Box_{\alpha}^{2} - \kappa\ )(F - F_0) = \frac{1}{\lambda_L^2}(F - F\ ), \tag{32}$$

And

$$(\Box_{\alpha}^{2} - \kappa\ )(J - J_0) = \frac{1}{\lambda_L^2}(J - J\ ), \tag{33}$$

where

$$\Box_{\alpha} = \nabla^{\alpha 2} - \frac{1}{c^2}\frac{\partial^{\alpha 2}}{\partial_t^{\alpha}}. \tag{34}$$

As far as I know, the above London-Proca-Hirsch equations on Cantor Sets have never been presented elsewhere before. Provided the above equations can be verified with experiments, they can be used to describe electrodynamics of fractal superconductors on Cantor sets.

As a last note, it seems interesting to remark here that Kruglov [15] has derived a square-root of Proca equations as a possible model for hadron mass spectrum, therefore perhaps equations (32)-(34) may be factorized too to find out a model for hadron masses (on Cantor sets). However, this problem is left for other paper.

Concluding remarks

In a recent paper Yang Zhao *et al*. derived Maxwell equations on Cantor sets from the local fractional vector calculus. It can be shown that Maxwell equations on Cantor sets in a fractal bounded domain give efficiency and accuracy for describing the fractal electric and magnetic fields. However, so far there is no derivation of equations for electrodynamics of superconductor on Cantor sets. Therefore, in this paper I present for the first time a derivation of London-Proca-Hirsch equations on Cantor sets. The name London-Proca-Hirsch is proposed because the equations were based on modifying London equations, Proca equations and Hirsch's theory of electrodynamics of superconductor.

Therefore the aim of the present paper is to propose a combined version of London-Proca-Hirsch model for electrodynamics of superconductor. Then I extend further this proposed model for electrodynamics of fractal superconductor on Cantor sets. Considering that Proca equations may be used to explain electrodynamics in superconductor, the proposed London-Proca-Hirsch equations on Cantor sets may be able to describe electromagnetic of fractal superconductors. It is hoped that this paper may stimulate further investigations and experiments in particular for fractal superconductor. It may be expected to have some impact to fractal cosmology modeling too.

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A Derivation of Proca Equations on Cantor Sets: A Local Fractional Approach

Victor Christianto

Abstract

In a recent paper published at *Advances in High Energy Physics* (AHEP)journal, Yang Zhao et al. derived Maxwell equations on Cantor sets from the local fractional vector calculus. It can be shown that Maxwell equations on Cantor sets in a fractal bounded domain give efficiency and accuracy for describing the fractal electric and magnetic fields. Using the same approach, elsewhere Yang, Baleanu & Tenreiro Machado derived systems of Navier-Stokes equations on Cantor sets. However, so far there is no derivation of Proca equations on Cantor sets. Therefore, in this paper I present for the first time a derivation of Proca equations and GravitoElectroMagnetic (GEM) Proca-type equations on Cantor sets. Considering that Proca equations may be used to explain electromagnetic effects in superconductor, I suggest that Proca equations on Cantor sets can describe electromagnetic of fractal superconductors; besides GEM Proca-type equations on Cantor sets may be used to explain some gravitoelectromagnetic effects of superconductor for fractal media. It is hoped that this paper may stimulate further investigations and experiments in particular for fractal superconductor. It may be expected to have some impact to fractal cosmology modeling too.

Key Words: Cantor sets, fractal cosmology, gravitoelectromagnetic effect, local fractional vector calculus, Maxwell equations, Proca equations, superconductor.

1. Introduction

According to the late Benoit Mandelbrot, fractal geometry is a workable geometric middle ground between excessive geometric order of Euclid and the geometric chaos of general mathematics. It is based on a form of symmetry that had previously been underused, namely invariance, under contraction or dilation. [1] Fractal geometry has many applications including in biology, physics, geophysics, engineering, mathematics, cosmology and other fields of science and art. A rapidly growing field is to express electromagnetic wave equations in fractal media.

The present paper is intended to be a follow-up paper of my three recent papers: one paper reviews Shpenkov's interpretation of classical wave equation and its role to explain periodic table of elements and other phenomena [16], and the second one presents a derivation of GravitoElectroMagnetic Proca equations in fractional space [19], and the third one presents an outline of cosmology based on the concept of fractal vibrating string [28].

The idea for writing the present paper comes from George Shpenkov's papers, where he shows that a correct interpretation of classical wave equation yields a periodic table of elements which is close to Mendeleyev's periodic law.[13][14][15] From that result he is able to derive many results corresponding to the structure of neutron, proton, and molecules based on classical wave equation:

$$\Delta\hat{\Psi} - \frac{1}{^2}\frac{^2\hat{\Psi}}{\partial t} = 0 \tag{1}$$

This equation is also known as the wave equation of sound or string vibration. George Shpenkov's work is based on: (1) Dialectical philosophy and dialectical logic; (2) The postulate on the *wave nature* of all phenomena and objects in the Universe.[12]

Now the question is: Is it possible to hypothesize that the entire Universe consists of sound wave and vibration and frequency, just like atoms and molecules? Interestingly, Leonardo Rubino puts forth that conjecture based on the same classical wave equation. [20][21] He hypothesizes that the frequency of the Universe is: [22]

$$f_{Univ} = 4,047\ 10^{-21} Hz \tag{2}$$

One persistent question in this regard is: How to explain photon as quanta and also photoelectric effect from this wave picture? Interestingly, Xin-an Zhang has provided an outline of answer to that question, which will be described as follows.[23] In his approach, the electromagnetic force is regarded as deferring to the sine function, reach the highest at the position of 1/4 wavelength. At this point, if the highest force is not able to move the particle, the particle will never been moved because the succeeding force will drop down with the law of sine function. That means, the energy transmission will occur only in the front of 1/4 wavelength of the light. As shown in Figure 1, the force f that the light wave strikes on the electron is $f = F\sin\varphi$, where F is the maximal value of force, φ is the phase angle.

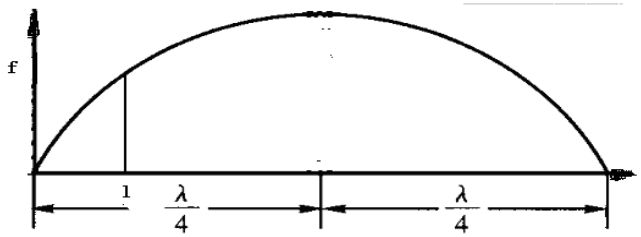

Figure 1. The force deferring to sine function acting on the particle [23]

When the displacement on the abscissa is l, the phase angle will be $2\pi\frac{l}{\lambda}$ and $f = F\sin(2\pi\frac{l}{\lambda})$.

Given that s is the displacement of the particle been pushed by the light wave and S is its maximal value, then the work that the wave force to the particle will be

$$W = \int_0^S F\sin(2\pi\frac{l}{\lambda})ds, \tag{3}$$

where the sine function can be expanded

$$\sin x = x - \frac{x^3}{3!} + \frac{x^5}{5!}\ldots \tag{4}$$

In accordance with the above discussion, the energy transmission merely happens at the front 1/4

wavelength. Thus, the $x = 2\pi \frac{l}{\lambda}$ is smaller than 1. And we get $\sin(2\pi \frac{l}{\lambda}) \approx \frac{2\pi l}{\lambda}$, then we substitute it into Eq. (3), finishing the integral and considering the energy has been transmitted totally, then we get

$$E = W = F \sin(2\pi \frac{l}{\lambda}) S = 2\pi FS \frac{l}{\lambda} \tag{5}$$

Designating c, λ, v and the light speed， wavelength and frequency separately, considering $l = ct$ and setting

$$h = 2\pi FS \frac{l}{c} = 2\pi Ft S \tag{6}$$

Hence, we get

$$E = hv \tag{7}$$

It can be concluded therefore, that the quanta of photon can be described from a wave viewpoint too. Xin-an Zhang is also able to explain Compton effect, atomic hydrogen spectrum formula, as well as the blackbody radiation from the viewpoint of wave vibration [23].

Therefore it appears interesting to generalize further the wave equation of sound, in particular considering new results in fractal geometry studies, as follows:

a. To generalize the wave equation of sound (1) to become fractal vibrating string or fractal wave equation;
b. To generalize the wave equation to become Maxwell equations and Proca equations for massive photon. Such a generalization is possible because when the non-differentiable terms are removed from Maxwell equations, it can easily be shown that the components of electrical field-strength and the components of magnetic field-strengths all satisfy the standard wave equation: $\nabla^2 \phi = \left(\frac{1}{\bar{c}^2} \right| \frac{\partial^2 \phi}{\partial}$, see Thornhill [25].
c. To generalize further Maxwell equations and Proca equations on Cantor sets.

For point a), it has been suggested in a recent paper to write down the wave equation on Cantor sets (local fractional wave equation) as follows: [24, p.2]

$$\frac{\partial^{2\alpha} u(x,t)}{\partial t^{2\alpha}} - a^{2\alpha} \frac{{}^{\alpha}u(x,t)}{\alpha} = 0 \tag{8}$$

where the operators are local fractional ones. For other approaches, see [17][18].

In this regard, in a recent paper Yang Zhao et al. derived Maxwell equations on Cantor sets from the local fractional vector calculus.[2] It can be shown that Maxwell equations on Cantor sets in a fractal bounded domain give efficiency and accuracy for describing the fractal electric and magnetic fields. Using the same approach, elsewhere Yang, Baleanu & Tenreiro Machado derived systems of Navier-Stokes equations on Cantor sets.[11] However, so far there is no derivation of Proca equations and GravitoElectroMagnetic Proca-type equations on Cantor sets. Therefore, in this paper I present for the first time a derivation of Proca equations and GravitoElectroMagnetic (GEM) Proca-type equations on Cantor sets. Considering that Proca equations may be used to explain electromagnetic effects in superconductor, I suggest that GEM Proca-type equations on Cantor sets may be used to explain some gravitoelectromagnetic effects of superconductor for fractal media. It is hoped that this paper may stimulate further investigations and experiments on gravitomagnetic effects in particular for superconductor. It may be expected to have some impact to fractal cosmology modeling too.

It shall be noted that the present paper is not intended to be a complete description of fractal gravitatoelectromagnetic wave theory on Cantor sets. Instead, this paper is intended to stimulate

further investigations and experiments related to gravitoelectromagnetic effects of superconductors in fractal media and their implications to fractal cosmology modeling.

2. A review of previous result - Maxwell equations on Cantor sets

I will not re-derive Maxwell equations here. For a good reference on Maxwell equations, see for example Julian Schwinger et al.'s book: *Classical Electrodynamics* [9]. Penrose also discusses Maxwell equations shortly in his book: *The Road to Reality*[10].

Zhao et al. were able to write the local fractional differential forms of Maxwell equations on Cantor sets as follows [2, p.4-5]:

- Gauss's law for the fractal electric field: $\nabla^{\alpha} \cdot D = \rho$, (9)

- Ampere's law in the fractal magnetic field: $\nabla^{\alpha} \times H = J_a + \frac{\partial^{\alpha} D}{\partial t^{\alpha}}$, (10)

- Faraday's law in the fractal electric field: $\nabla^{\alpha} \times E = -\frac{\partial^{\alpha} B}{\partial t^{\alpha}}$, (11)

- magnetic Gauss's law in the fractal magnetic field: $\nabla^{\alpha} \cdot B = 0$, (12)

and the continuity equation can be defined as:

$$\nabla^{\alpha} \cdot J = -\frac{\partial^{\alpha} \rho}{\partial t^{\alpha}}, \tag{13}$$

where $\nabla^{\alpha} \cdot r$ and $\nabla^{\alpha} \times r$ are defined as follows:

2.1. In Cantor coordinates [11, p. 2]:

$$\nabla^{\alpha} \cdot u = div^{\alpha} u = \frac{\partial^{\alpha} u_1}{\partial x_1^{\alpha}} + \frac{\partial^{\alpha} u}{\partial x_2^{\alpha}} + \frac{\partial^{\alpha} u_3}{\partial x_3^{\alpha}}, \tag{14}$$

$$\nabla^{\alpha} \times u = curl^{\alpha} u = \left(\frac{\partial^{\alpha} u_3}{\partial x_2^{\alpha}} - \frac{\partial^{\alpha} u_2}{\partial x_3^{\alpha}} \right) e_1^{\alpha} + \left(\frac{\partial^{\alpha} u_1}{\partial x_3^{\alpha}} - \frac{\partial^{\alpha} u_3}{\partial x_1^{\alpha}} \right) e_2^{\alpha} + \left(\frac{\partial^{\alpha} u_2}{\partial x_1^{\alpha}} - \frac{\partial^{\alpha} u_1}{\partial x_2^{\alpha}} \right) e_3^{\alpha} . \tag{15}$$

2.2. In Cantor-type cylindrical coordinates [2, p.4]:

$$\nabla^{\alpha}\cdot r=\frac{r_{R}}{\partial R^{\alpha}}+\frac{1}{R^{\alpha}}\frac{\partial^{\alpha}r_{\theta}}{\partial\theta^{\alpha}}+\frac{r_{R}}{R^{\alpha}}+\frac{\partial^{\alpha}r_{z}}{\partial z^{\alpha}}, \tag{16}$$

$$\nabla^{\alpha}\times r=\left(\frac{1}{R^{\alpha}}\frac{\partial^{\alpha}r_{\theta}}{\partial\theta^{\alpha}}-\frac{\partial^{\alpha}r_{\theta}}{\partial z^{\alpha}}\right)e_{R}^{\alpha}+\left(\frac{\partial^{\alpha}r_{R}}{\partial z^{\alpha}}-\frac{\partial^{\alpha}r_{z}}{\partial R^{\alpha}}\right)e_{\theta}^{\alpha}+\left(\frac{\partial^{\alpha}r_{\theta}}{\partial R^{\alpha}}+\frac{r_{R}}{R^{\alpha}}-\frac{1}{R^{\alpha}}\frac{\partial^{\alpha}r_{R}}{\partial\theta^{\alpha}}\right)e^{\alpha}. \tag{17}$$

It is worth noting here, that Martin Ostoja-Starzewski has derived Maxwell equations in anisotropic fractal media using a different method. [3]

3. Proca Equations on Cantor Sets

Proca equations can be considered as an extension of Maxwell equations, and they have been derived in various ways, see for instance [4, 6, 7]. It can be shown that Proca equations can be derived from first principles [6], and also that Proca equations may have link with Klein-Gordon equation [7]. However, in this paper I will not attempt to re-derive Proca equations. Instead, I will use Proca equations as described in [6]. Then I will derive the Proca equations on Cantor Sets, in accordance with Zhao et al.'s approach as outlined above [2].

According to Blackledge, Proca equations can be written as follows [7]

$$\nabla\cdot\vec{E}=\frac{\rho}{\varepsilon_{0}}-\kappa^{2}\phi, \tag{18}$$

$$\nabla\cdot\vec{B}=0, \tag{19}$$

$$\nabla\times\vec{E}=-\frac{\partial\vec{B}}{\partial t}, \tag{20}$$

$$\nabla\times\vec{B}=\mu_{0}j+\varepsilon_{0}\mu_{0}\frac{\partial\vec{E}}{\partial t}+\kappa^{2}\vec{A}, \tag{21}$$

where:

$$\nabla\phi=-\frac{\partial\vec{A}}{\partial t}-\vec{E}, \tag{22}$$

$$\vec{B}=\nabla\times\vec{A}, \tag{23}$$

$$\kappa = \frac{mc_0}{\hbar}. \tag{24}$$

Therefore, by using the definitions in equations (14)-(17), we can arrive at Proca equations on Cantor sets from (18) through (23), as follows:

$$\nabla^\alpha \cdot \vec{E} = \frac{\rho}{\varepsilon_0} - \kappa^2 \phi, \tag{25}$$

$$\nabla^\alpha \cdot \vec{B} = 0, \tag{26}$$

$$\nabla^\alpha \times \vec{E} = -\frac{\partial^\alpha \vec{B}}{\partial t^\alpha}, \tag{27}$$

$$\nabla^\alpha \times \vec{B} = \mu_0 j_a + \varepsilon_0 \mu_0 \frac{\partial^\alpha \vec{E}}{\partial t^\alpha} + \kappa^2 \vec{A}, \tag{28}$$

where:

$$\nabla^\alpha \phi = -\frac{\partial^\alpha \vec{A}}{\partial t^\alpha} - \vec{E}, \tag{29}$$

$$\vec{B} = \nabla^\alpha \times \vec{}, \tag{30}$$

and Del operator $\nabla^\alpha \phi$ can be defined as follows [11, p.2]:

$$\nabla^\alpha \phi = \frac{\partial^\alpha \phi}{\partial \underset{1}{\overset{\alpha}{}}} \underset{1}{\overset{\alpha}{}} + \frac{\partial^\alpha \phi}{x_2^\alpha} e_2^\alpha + \frac{\partial^\alpha \phi}{\underset{3}{\overset{\alpha}{}}} \underset{3}{\overset{\alpha}{}}. \tag{31}$$

To my best knowledge so far, the above expressions of Proca equations on Cantor sets (25)-(30) have not been proposed elsewhere before.

Since according to Blackledge, the Proca equations can be viewed as a *unified wavefield* model of electromagnetic phenomena [7], therefore we can also regard the Proca equations on Cantor sets as a further generalization of Blackledge's *unified wavefield* model.

It appears interesting to remark here, that Luke Kenneth Casson Leighton [26] recently introduces an expansion of the Rishon Model to cover quark generations. He only uses a simple

assumption that all particles in effect photons phase-locked in a repeating pattern inherently obeying Maxwell equations. Therefore, it may be expected that Proca equations on Cantor sets may have some impacts on the nature of Rishon Model.

One persistent question concerning these Proca equations is how to measure the mass of the photon. This question has been discussed in lengthy by Tu, Luo & Gillies [27]. According to their report, there are various methods to estimate the upper bound limits of photon mass. In Table 1 below, some of upper bound limits of photon mass based on dispersion of speed of light are summarized.

Table 1. Upper bound on the dispersion of the speed of light in different ranges of the electromagnetic spectrum, and the corresponding limits on the photon mass. [27, p.94]

Author (year)	Type of measurement	Limits on m_γ (g)
Ross et al. (1937)	Radio waves transmission overland	5.9×10^{-42}
Mandelstam & Papalexi (1944)	Radio waves transmission over sea	5.0×10^{-43}
Al'pert et al. (1941)	Radio waves transmission over sea	2.5×10^{-43}
Florman (1955)	Radio-wave interferometer	5.7×10^{-42}
Lovell et al. (1964)	Pulsar observations on flour flare stars	1.6×10^{-42}
Frome (1958)	Radio-wave interferometer	4.3×10^{-40}
Warner et al. (1969)	Observations on Crab Nebula pulsar	5.2×10^{-41}
Brown et al. (1973)	Short pulses radiation	1.4×10^{-33}
Bay et al. (1972)	Pulsar emission	3.0×10^{-46}
Schaefer (1999)	Gamma ray bursts	4.2×10^{-44}
	Gamma ray bursts	6.1×10^{-39}

From this table and also from other results as reported in [27], it seems that we can expect that someday photon mass can be observed within experimental bound.

4. GravitoElectroMagnetic (GEM) Proca-type Equations on Cantor Sets

The term GravitoElectroMagnetism (GEM) refers to the formal analogies between Newton's law of gravitation and Coulomb's law of electricity. The theoretical analogy between the electromagnetic and the gravitational field equations has been first suggested by Heaviside in 1893, see for example [8]. The fields of GEM can be defined in close analogy with the classical electrodynamics. Therefore, if we can consider Proca equations as generalization and extension of Maxwell equations, then we can also find **GravitoElectroMagnetic** Proca-type equations.

In accordance with Demir [8], the GravitoElectroMagnetic Proca-type equations can be expressed straightforward from their electromagnetic counterpart as follows (Here I use Demir's notations instead of Blackledge's notations):

$$\nabla \cdot \vec{E}_g = -\rho_e - \kappa_g^2 \phi \,, \tag{32}$$

$$\nabla \cdot \vec{H}_g = 0 \,, \tag{33}$$

$$\nabla \times \vec{E}_g = -\frac{\partial \vec{H}_g}{\partial t} \,, \tag{34}$$

$$\nabla \times \vec{H}_g = -J_g^e + \frac{\partial \vec{E}_g}{\partial t} + \kappa_g{}^2 \vec{A}_g \,, \tag{35}$$

where the fields E_g and H_g can be defined in terms of the potentials just as given in equation (22) and (23), and the term κ_g represents the inverse Compton wavelength of the graviton, [8]

$$\kappa_g = \frac{m_g c}{\hbar} \,. \tag{36}$$

Now I will present the GEM Proca-type equations on Cantor sets using the same method as described in the previous section and with definitions in equations (14)-(17), as follows:

$$\nabla^\alpha \cdot \vec{E}_g = -\rho_e - \kappa_g^2 \phi \,, \tag{37}$$

$$\nabla^{\alpha} \cdot \vec{H}_g = 0\,, \tag{38}$$

$$\nabla^{\alpha} \times \vec{E}_g = -\frac{\partial^{\alpha} \vec{H}_g}{\partial t^{\alpha}}\,, \tag{39}$$

$$\nabla^{\alpha} \times \vec{H}_g = -J_g^e + \frac{\partial^{\alpha} \vec{E}_g}{\partial t^{\alpha}} + \kappa_g{}^2 \vec{A}_g\,, \tag{40}$$

To my best knowledge so far, the above expressions of GravitoElectroMagnetic Proca equations on Cantor sets (37)-(40) have not been proposed elsewhere before. It will be interesting to conduct experiments to measure on how extent these equations on Cantor sets differ from the GEM Proca equations [4][5].

Concluding remarks

In a recent paper Yang Zhao et al. derived Maxwell's equation on Cantor sets from the local fractional vector calculus. It can be shown that Maxwell's equations on Cantor sets in a fractal bounded domain give efficiency and accuracy for describing the fractal electric and magnetic fields. Using the same approach, elsewhere Yang, Baleanu & Tenreiro Machado derived systems of Navier-Stokes equations on Cantor sets. However, so far there is no derivation of Proca equations and GravitoElectroMagnetic Proca-type equations on Cantor sets. Therefore, in this paper I present for the first time a derivation of Proca equations and GravitoElectroMagnetic (GEM) Proca-type equations on Cantor sets. Considering that Proca equations may be used to explain electromagnetic effects in superconductor, I suggest that GEM Proca-type equations on Cantor sets may be used to explain some gravitoelectromagnetic effects of superconductor for fractal media. It is hoped that this paper may stimulate further investigations and experiments on gravitomagnetic effects in particular for superconductor. It may be expected to have some impact to fractal cosmology modeling too.

It shall be noted that the present paper is not intended to be a complete description of fractal gravitation wave theory on Cantor sets. Instead, this paper is intended to stimulate further investigations and experiments related to gravitomagnetic effect of superconductors and their implications to fractal cosmology modeling. This kind of investigation may be useful for the study of gravitomagnetic effects.

Of course, any generalization and simplification have its own risk, but we should also remember that Schrödinger himself considered that everything is wave, although he failed to convince anyone else. Furthermore, there is a wave function model of universe known as Wheeler-DeWitt equation, which is quite popular in quantum cosmology study. However, it is known that WDW equation lacks observational support. Therefore we hope that using the wave equation we may obtain better results.

By suggesting that Universe can be modeled as a wave, we wish to push the boundary of observation limit. Only time will tell if this endeavor will yield something.

Acknowledgments: I'd like to thank Dr. George Shpenkov for sending his papers. Special thanks to Dr. Xin-an Zhang for sending his papers too. Nonetheless, the ideas presented here are my sole responsibility.

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Extending Lehnert's Revised Quantum Electrodynamics to Fractal Media and Cantor Sets: Towards Physics beyond Standard Model

Victor Christianto

Abstract

In a series of papers, Bo Lehnert proposed a novel and revised version of Quantum Electrodynamics (RQED) based on Proca equations. However, as far as I know there is no paper yet for extending his RQED to fractal media and Cantor Sets. Drawing similarity between Proca and Maxwell equations, in the present paper I extend RQED further based on a recent paper published at *Advances in High Energy Physics* (AHEP) journal, where Yang Zhao et al. derived Maxwell equations on Cantor sets from the local fractional vector calculus. It can be shown that Maxwell equations on Cantor sets in a fractal bounded domain give efficiency and accuracy for describing the fractal electric and magnetic fields. I also extend RQED to anisotropic fractal media based on the work of Martin Ostoja-Starzewski. It is hoped that this paper may stimulate further investigations and experiments in particular for finding physics beyond Standard Model in fractal media. It may be expected to have some impact to fractal cosmology modeling too.

Key Words: Cantor sets, local fractional vector calculus, Navier-Stokes-Durand, Maxwell equations, Proca equations, fractal cosmology.

1. Introduction

Conventional electromagnetic theory based on Maxwell's equations and quantum mechanics has been successful in its applications in numerous problems in physics, and has sometimes manifested itself in a good agreement with experiments. Nevertheless, as already stated by Feynman, there are unsolved problems leading to difficulties with Maxwell's equations that are not removed by and not directly associated with quantum mechanics [20]. Therefore QED, which is an extension of Maxwell's equations, also becomes subject to the typical shortcomings of electromagnetic in its conventional form. This reasoning makes a way for Revised Quantum Electrodynamics as proposed by Bo Lehnert.

According to the late Benoit Mandelbrot, fractal geometry is a workable geometric middle ground between excessive geometric order of Euclid and the geometric chaos of general

mathematics. It is based on a form of symmetry that had previously been underused, namely invariance, under contraction or dilation. [1] Fractal geometry has many applications including in biology, physics, geophysics, engineering, mathematics, cosmology and other fields of science and art. A rapidly growing field is to express electromagnetic wave equations in fractal media. An interesting piece in this regard is a paper by Martin Ostoja-Starzewski, where he is able to derive Maxwell equations in anisotropic fractal media [3]. Therefore it is reasonable to consider an extension of RQED to Cantor Sets and fractal media. That is the purpose of this paper.

In the meantime, it is known that Maxwell himself described his theory of electromagnetism based on elastic ether, therefore it seems worth to re-derive his equations from elasticity theory. Therefore, in the next section I will discuss 3 possible methods to link elasticity theory and Maxwell equations. The third section will discuss Lehnert's RQED. Then I will discuss Maxwell equations on Cantor sets. The fifth section will discuss how to extend Proca equations and RQED on Cantor Sets. The sixth section will discuss how to extend Proca equations and RQED on fractal media. The seventh section will discuss some implications for cosmology including dark matter and massive gravitational wave.

2. Review of 3 methods to derive Maxwell equations from elasticity theory

As far as I know there are at least 3 possible methods to connect elasticity theory and Maxwell equations. Here I will briefly discuss the methods proposed by Algirdas Maknickas, Valery Dmitriyev, and David Zareski.

a. Maknickas's approach [5]:

According to Maknickas, the classical electromagnetic field theory is based on similarity to the classic dynamic of solid continuum media. Therefore he thinks that it is required to

consider a *micropolar extension* of electromagnetic field equations based on Cosserat media. In essence, besides the well-known four differential equations of Maxwell, Maknickas proposed additional four Maxwell equations for rotational components using micropolar elasticity analogy [5, p. 5-6]:

- Micropolar Gauss's law for electric field: $\nabla \cdot C = \frac{\rho c}{\gamma_0}$. (1)

- Micropolar Gauss's law for magnetic field: $\nabla \cdot G = 0$. (2)

- Micropolar Maxwell-Faraday equation: $\nabla \times C = -\frac{\partial G}{\partial t}$. (3)

- Micropolar Ampere's circuital law: $\nabla \times G = \beta_0 \left(J_G + \gamma_0 \frac{\partial C}{\partial t} \right)$. (4)

b. Dmitriyev's approach [16, p.7]:

According to Dmitriyev, classical electrodynamics was found to correspond to incompressible linear elasticity. And this analogy has formal character. By using a new definition:

$$E = \kappa \left[c^2 \nabla \times (\nabla \times s) - f \right], \quad (3)$$

And defining the density j of electric current by

$$\varsigma j = -\kappa a v \delta(x - x'), \quad (4)$$

Then he obvtained the Maxwell equations:

$$\partial_t E - c\nabla \times (\nabla \times A) + 4\pi j = 0, \text{ and} \quad (5)$$

$$\nabla \cdot E = 4\pi q \delta(x - x'). \quad (6)$$

c. Zareski's approach [17-19]:

His model is based on the Navier-Stokes-Durand equation of elasticity, as follows:

$$curl\frac{C}{2}+(\sigma+\eta)grad(div\xi)+\eta\nabla^2\xi+f=\partial_t(\rho\partial_t\xi). \quad (7)$$

Then he considers the particular case of conservative elasticity where the elastic medium is governed, by the following equation:

$$(\sigma+2\eta)grad(div\xi)+f=0. \quad (8)$$

From these equations, after some changes of variables, he recovers Maxwell equations. The above are 3 methods to connect elasticity theory to Maxwell's equations. Therefore it is appropriate to generalize them further to Proca equations for massive electrodynamics.

3. Lehnert's Revised Quantum Electrodynamics

Conventional electromagnetic theory based on Maxwell's equations and quantum mechanics has been successful in its applications in numerous problems in physics, and has sometimes manifested itself in a good agreement with experiments. Nevertheless, as already stated by Feynman, there are unsolved problems leading to difficulties with Maxwell's equations that are not removed by and not directly associated with quantum mechanics [20]. Therefore QED, which is an extension of Maxwell's equations, also becomes subject to the typical shortcomings of electromagnetic in its conventional form. This reasoning makes a way for Revised Quantum Electrodynamics as proposed by Bo Lehnert.

In a series of papers, Bo Lehnert proposed a novel and revised version of Quantum Electrodynamics, which he calls as RQED. His theory is based on the hypothesis of a nonzero electric charge density in the vacuum, and it is based on Proca-type field equations [20, p. 23]:

$$\left(\frac{1}{c^2}\frac{\partial^2}{\partial t^2}-\nabla^2\right)A_\mu=\mu_0 J_\mu, \mu=1,2,3,4 \quad (9)$$

Where

$$A_\mu = \left(A, \frac{i\phi}{c} \right), \tag{10}$$

With A and ϕ standing for the magnetic vector potential and the electrostatic potential in three-space. In three dimensions equation (9) in the vacuum results in [20, p.23]:

$$\frac{curlB}{\mu_0} = \varepsilon_0 (divE)C + \frac{\varepsilon_0 \partial E}{\partial t}, \tag{11}$$

$$curlE = -\frac{\partial B}{\partial t}, \tag{12}$$

$$B = curlA, divB = 0, \tag{13}$$

$$E = -\nabla\phi - \frac{\partial A}{\partial t}, \tag{14}$$

$$divE = \frac{\bar{\rho}}{\varepsilon_0}. \tag{15}$$

These equations differ from the conventional form, by a nonzero electric field divergence equation (15) and by the additional space-charge current density in addition to displacement current at equation (11). The extended field equations (11)-(15) are easily found also to become invariant to a gauge transformation.[20, p.23]

The main characteristic new features of the present theory can be summarized as follows [20, p.24]:

a. The hypothesis of a nonzero electric field divergence in the vacuum introduces an additional degree of freedom, leading to new physical phenomena. The associated nonzero electric charge density thereby acts somewhat like a hidden variable.
b. This also abolishes the symmetry between the electric and magnetic fields, and then the field equations obtain the character of intrinsic linear symmetry breaking.
c. The theory is both Lorentz and gauge invariant.
d. The velocity of light is no longer a scalar quantity, but is represented by a velocity vector of the modulus c.
e. Additional results: Lehnert is also able to derive the mass of Z boson and Higgs-like boson.[21-23] These would pave an alternative way to new physics beyond Standard Model.

Now let us extend Lehnert's RQED to Cantor sets and fractal media. Such an extension may be found worth while, considering there is already a new proposal to extend QED to inhomogenous anisotropic media.[24] Nonetheless, my approaches as presented here are different from [24].

First we will review Maxwell equations on Cantor sets.

4. A review of previous result - Maxwell equations on Cantor sets

I will not re-derive Maxwell equations here. For a good reference on Maxwell equations, see for example Julian Schwinger et al.'s book: *Classical Electrodynamics* [9]. Penrose also discusses Maxwell equations shortly in his book: *The Road to Reality*[10].

Zhao et al. were able to write the local fractional differential forms of Maxwell equations on Cantor sets as follows [2, p.4-5]:

- Gauss's law for the fractal electric field: $\nabla^{\alpha} \cdot D = \rho$, (16)

- Ampere's law in the fractal magnetic field: $\nabla^{\alpha} \times H = J_a + \frac{\partial^{\alpha} D}{\partial t^{\alpha}}$, (17)

- Faraday's law in the fractal electric field: $\nabla^{\alpha} \times E = -\frac{\partial^{\alpha} B}{\partial t^{\alpha}}$, (18)

- magnetic Gauss's law in the fractal magnetic field: $\nabla^{\alpha} \cdot B = 0$, (19)

and the continuity equation can be defined as:

$$\nabla^{\alpha} \cdot J = -\frac{\partial^{\alpha} \rho}{\partial t^{\alpha}}, \tag{20}$$

where $\nabla^{\alpha} \cdot r$ and $\nabla^{\alpha} \times r$ are defined as follows:

2.1. In Cantor coordinates [11, p. 2]:

$$\nabla^{\alpha} \cdot u = div^{\alpha} u = \frac{\partial^{\alpha} u_1}{\partial x_1^{\alpha}} + \frac{\partial^{\alpha} u}{\partial x_2^{\alpha}} + \frac{\partial^{\alpha} u_3}{\partial x_3^{\alpha}}, \tag{21}$$

$$\nabla^{\alpha} \times u = curl^{\alpha} u = \left(\frac{\partial^{\alpha} u_3}{\partial x_2^{\alpha}} - \frac{\partial^{\alpha} u_2}{\partial x_3^{\alpha}} \right) e_1^{\alpha} + \left(\frac{\partial^{\alpha} u_1}{\partial x_3^{\alpha}} - \frac{}{\partial x_1^{\alpha}} \right) e_2^{\alpha} + \left(\frac{\partial^{\alpha} u_2}{\partial x_1^{\alpha}} - \frac{\partial^{\alpha} u_1}{\partial x_2^{\alpha}} \right) e_3^{\alpha} . \tag{22}$$

2.2. In Cantor-type cylindrical coordinates [2, p.4]:

$$\nabla^{\alpha} \cdot r = \frac{\partial^{\alpha} r_R}{\partial R^{\alpha}} + \frac{1}{R^{\alpha}} \frac{\partial^{\alpha} r_{\theta}}{\partial \theta^{\alpha}} + \frac{r_R}{R^{\alpha}} + \frac{r_z}{\partial z^{\alpha}}, \tag{23}$$

$$\nabla^{\alpha} \times r = \left(\frac{1}{R^{\alpha}} \frac{\partial^{\alpha} r_{\theta}}{\partial \theta^{\alpha}} - \frac{\partial^{\alpha} r_{\theta}}{\partial z^{\alpha}} \right) e_R^{\alpha} + \left(\frac{\partial^{\alpha} r_R}{\partial z^{\alpha}} - \frac{\partial^{\alpha} r_z}{\partial R^{\alpha}} \right) e_{\theta}^{\alpha} + \left(\frac{\partial^{\alpha} r_{\theta}}{\partial R^{\alpha}} + \frac{r_R}{R^{\alpha}} - \frac{}{R^{\alpha}} \frac{\partial^{\alpha} r_R}{\partial \theta^{\alpha}} \right) e^{\alpha} . \tag{24}$$

5. Extending Lehnert's Proca Equations on Cantor Sets

Proca equations can be considered as an extension of Maxwell equations, and they have been derived in various ways. It can be shown that Proca equations can be derived from first principles [6], and also that Proca equations may have link with Klein-Gordon equation [7].

However, in this paper I will not attempt to re-derive Proca equations. Instead, I will derive the Proca equations on Cantor Sets, in accordance with Lehnert's approach as outlined above [20].

Therefore, by using the definitions in equations (21)-(24), we can arrive at Proca equations on Cantor sets from (11) through (15), as follows:

$$\frac{curl^{\alpha} B}{\mu_0} = \varepsilon_0 \left(div^{\alpha} E\right) C + \frac{\varepsilon_0 \partial^{\alpha} E}{\partial t^{\alpha}}, \tag{25}$$

$$curl^{\alpha} E = -\frac{\partial^{\alpha} B}{\partial t^{\alpha}}, \tag{26}$$

$$div^{\alpha} B = 0, \tag{27}$$

$$div^{\alpha} E = \frac{\overline{\rho}}{\varepsilon_0}. \tag{28}$$

where:

$$\nabla^{\alpha} \phi = -\frac{\partial^{\alpha} \vec{A}}{\partial t^{\alpha}} - \vec{E}, \tag{29}$$

$$\vec{B} = \nabla^{\alpha} \times \vec{}, \tag{30}$$

and Del operator $\nabla^{\alpha} \phi$ can be defined as follows [11, p.2]:

$$\nabla^{\alpha} \phi = \frac{{}^{\alpha}\phi}{\partial {}^{\alpha}_{1}} {}^{\alpha}_{1} + \frac{\partial^{\alpha} \phi}{x_2^{\alpha}} e_2^{\alpha} + \frac{\partial^{\alpha} \phi}{{}^{\alpha}_{3}} {}^{\alpha}_{3}. \tag{31}$$

To my best knowledge so far, the above extension of Lehnert's RQED on Cantor sets (25)-(30) have not been proposed elsewhere before.

Since according to Blackledge, the Proca equations can be viewed as a *unified wavefield* model of electromagnetic phenomena [7], therefore we can also regard the Proca equations on Cantor sets as a further generalization of Blackledge's *unified wavefield* model.

One persistent question concerning these Proca equations is how to measure the mass of the photon. This question has been discussed in lengthy by Tu, Luo & Gillies [15]. According to their report, there are various methods to estimate the upper bound limits of photon mass. In Table 1 below, some of upper bound limits of photon mass based on dispersion of speed of light are summarized.

Table 1. Upper bound on the dispersion of the speed of light in different ranges of the electromagnetic spectrum, and the corresponding limits on the photon mass. [15, p.94]

Author (year)	Type of measurement	Limits on m_γ (g)
Ross et al. (1937)	Radio waves transmission overland	5.9×10^{-42}
Mandelstam & Papalexi (1944)	Radio waves transmission over sea	5.0×10^{-43}
Al'pert et al. (1941)	Radio waves transmission over sea	2.5×10^{-43}
Florman (1955)	Radio-wave interferometer	5.7×10^{-42}
Lovell et al. (1964)	Pulsar observations on flour flare stars	1.6×10^{-42}
Frome (1958)	Radio-wave interferometer	4.3×10^{-40}
Warner et al. (1969)	Observations on Crab Nebula pulsar	5.2×10^{-41}
Brown et al. (1973)	Short pulses radiation	1.4×10^{-33}
Bay et al. (1972)	Pulsar emission	3.0×10^{-46}
Schaefer (1999)	Gamma ray bursts	4.2×10^{-44}
	Gamma ray bursts	6.1×10^{-39}

From this table and also from other results as reported in [15], it seems that we can expect that someday photon mass can be observed within experimental bound.

6. Extending Revised Quantum Electrodynamics on fractal media

It is worth noting here, that Martin Ostoja-Starzewski has derived Maxwell equations in anisotropic fractal media using a different method.[3] Therefore it is interesting to find out how we can extend Lehnert's RQED to fractal media too.

First let us begin with some basic definitions as given by Ostoja-Starzewski [3]:

$$\nabla^D \phi = e_k \nabla_k^D \phi, \tag{32}$$

$$divf = \nabla^D \cdot f, \tag{33}$$

$$curlf = \nabla^D \times f. \tag{34}$$

Based on the above definitions, now I extend Lehnert's RQED to anisotropic fractal media case, as follows:

$$\frac{curl^D B}{\mu_0} = \varepsilon_0 \left(div^D E\right) C + \frac{\varepsilon_0 \partial^D E}{\partial t}, \tag{35}$$

$$curl^D E = -\frac{\partial^D B}{\partial t}, \tag{36}$$

$$div^D B = 0, \tag{37}$$

$$div^D E = \frac{\overline{\rho}}{\varepsilon_0}. \tag{38}$$

To the best of my knowledge, these extensions of Lehnert's RQED to Cantor sets and fractal media have never been proposed elsewhere before.

7. Some implications for astrophysics and cosmology

Beside RQED's implications to Standard Model of Particles, it seems possible to consider that connecting Maxwell equations and elasticity theory can lead to far-reaching implications, such that new explanation of dark matter [17], possible massive gravitational wave [25], and also new explanation of dark energy as elastic strain fluid [26]. It may be expected to have some impact to cosmology modeling on fractal media too. Another possible direction of further research is micropolar fluid cosmology. It should be clear that applications of elasticity theory to cosmology will be fruitful. [27][28][29]

Concluding remarks

In a series of papers, Bo Lehnert proposed a novel and revised version of Quantum Electrodynamics (RQED) based on Proca equations. However, as far as I know there is no paper yet for extending his RQED to fractal media and Cantor Sets. Drawing similarity between Proca and Maxwell equations, in the present paper I extend RQED further based on a recent paper published at *Advances in High Energy Physics* (AHEP) journal, where Yang Zhao et al. derived Maxwell equations on Cantor sets from the local fractional vector calculus. It can be shown that Maxwell equations on Cantor sets in a fractal bounded domain give efficiency and accuracy for describing the fractal electric and magnetic fields. I also extend RQED to anisotropic fractal media based on the work of Martin Ostoja-Starzewski. It is hoped that this paper may stimulate further investigations and experiments in particular for finding physics beyond Standard Model in fractal media. It may be expected to have some impact to fractal cosmology modeling too.

It shall be noted that the present paper is not intended to be a complete description of physics beyond Standard Model on Cantor sets. Instead, this paper is intended to stimulate further investigations and experiments, and their implications to fractal cosmology modeling.

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It's *Déjà Vu* All Over Again: A Classical Interpretation of Syntropy and Precognitive Interdiction Based on Wheeler-Feynman's Absorber Theory

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ABSTRACT

It has been known for long time that intuition plays significant role in many professions and human life, including in entrepreneurship, government, and also in detective or law enforcement activities. Even women are known to possess better intuitive feelings or "hunch" compared to men. Despite these examples, such a precognitive interdiction is hardly accepted in established science. In this paper, we discuss briefly the advanced solutions of Maxwell equations, and then make connection between syntropy and precognition from classical perspective. It is our hope that the new proposed method can be verified with experimental data. But we admit that our model is still in its infancy, more researches are needed to fill all the missing details.

Keywords: intuition, syntropy, precognition, Maxwell equation, advanced wave solution.

1. Introduction

It has been known for long time that intuition plays significant role in many professions and other aspects of human life, including in entrepreneurship, government, and also in detective or law enforcement activities. Even women are known to possess better

intuitive feelings or "*hunch*" compared to men.[1] Despite these examples, such a precognitive interdiction is hardly accepted in established science.

In this paper, we discuss briefly the advanced solutions of Maxwell equations in the context of Wheeler-Feynman-Cramer's absorber theory, and then make connection between syntropy and precognition from classical perspective. This may be regarded as first step to describe such precognition activities which are usually considered belong to quantum realm.

It is our hope that the new proposed method can be verified with experimental data. Nonetheless, we admit that our model is still in its infancy, more researches are needed to fill all the missing details.

2. John Cramer's take on Wheeler-Feynman's absorber theory

The Wheeler-Feynman's paper on absorber theory has been discussed and generalized by John Cramer. He discussed among other things on the physical interpretation of advanced and retarded solutions of Maxwell equations and also Klein-Gordon equation.

Our discussion starts from the fundamental Maxwell's equations that unify electromagnetism[1]:

$$\begin{aligned} &\nabla \cdot B = 0(MagneticGauss), \\ &\nabla \cdot D = \rho_f (Gauss), \\ &\nabla \times E + \partial_t B = 0(Faraday), \\ &\nabla \times H - \partial_t D = J_f (Amperecircuitallaw), \end{aligned} \tag{1}$$

It is known that electromagnetic wave equation corresponding to (1) admits advanced wave solution.

[1] This paper is inspired in part by our discussion few months ago with Carmen Wrede from Gerrmany. She told that she got a *hunch* or a feeling to experience electromagnetic wave from certain future events.

Of course, here we do not have to accept all transactional QM interpretation by Cramer[1][2], but we can keep our discussion straightly within the scope of classical electromagnetic theory.

The electromagnetic wave equation for source-free space can be written in the form:

$$c^2\nabla^2\vec{F} = \frac{d^2\vec{F}}{dt^2}, \tag{2}$$

where c represents the speed of light, and F represents either the electric field vector E or the magnetic field vector B of the wave.[1]

Since this differential equation is second order in both time and space, it has two independent time solutions and two independent space solutions. Let us restrict our consideration to one dimension by requiring that the wave motion described by equation (2) moves along with x axis and that the E vector of the wave is along the y axis.

Then two independent time solutions of equation (2) might have the form [1]:

$$\vec{E}_{\pm}(x,t) = \hat{y}E_0 \sin\left[2\pi\left(\frac{x}{\lambda} \pm ft\right)\right], \tag{3}$$

and

$$\vec{B}_{\pm}(x,t) = \hat{y}B_0 \sin\left[2\pi\left(\frac{x}{\lambda} \pm ft\right)\right], \tag{4}$$

Quoting from Cramer's notes on the solutions of equations (3) and (4):[1]

> Thus, wave $E_+(x,t)$ is a *negative-energy* (and negative-frequency) solution of Eq. (1). As mentioned above, it will arive at a point a distance x from the source at a time $t = x/c$ *before* the instant of emission. For this reason, it is called an *advanced* wave. Solution $E_-(x,t)$, on the other hand, is the more familiar positive-energy solution of Eq. (1). It arrives at x a time $t = x/c$ after the instant of emission and is called the *retarded* solution.

It should be clear, therefore, that advanced wave solution is inherent in the classical electromagnetic wave equations, without having to resort to Cramer's transactional interpretation of QM.

Next, we are going to discuss physical interpretation of such an advanced wave solution.

3. Interpretation of Advanced Wave Solution: Syntropy and Precognition

The above analysis by Cramer which seems to suggest that EPR paradox just disappears when considering the advanced waves to be real physical entities, has been suggested by other physicists too, notably: Costa de Beauregard and also Luigi Fantappie. While working on quantum mechanics and special relativity equations, Luigi noted that that retarded waves (retarded potentials) are governed by the law of entropy, while the advanced waves are governed by a symmetrical law that he named "*syntropy*."[3]

Therefore, some psychologists who work in this area began to make connection between the notion of syntropy and precognitive interdiction. And recently, a new journal by title *Syntropy* has been started to facilitate such a discussion.

But again let us emphasize here that equation (3) and (4) indicate that the advanced wave solutions have purely classical origin. Therefore, we do not discuss yet their connection with other alleged QM phenomena such as collapsing wave function which is hardly

possible to prove experimentally, despite Bohr and Heisenberg insisted such a phenomenon is real. This is our departure to QM's inspired syntropy discussions in [3]-[6].

Our knowledge in this area is very limited, but we can expect that research in this direction of precognitive interdiction will flourish in the near future, once we can accept that it is purely classical origin, so we do not have to invoke complicated QM arguments.

As a last remark for experimenters, it may be advisable to verify this syntropy effect in women, especially those who are already proved as good '*precogniters*."

4. Concluding Remarks

It has been known for long time that intuition plays significant role in many professions and various aspects of human life, including in entrepreneurship, government, and also in detective or law enforcement activities. Even women are known to possess better intuitive feelings or "hunch" compared to men.

Despite these examples, such a precognitive interdiction (hunch) is hardly accepted in established science. In this paper, we discuss briefly the advanced solutions of Maxwell equations, and then make connection between syntropy and precognition from classical perspective. This may be regarded as first step to describe such precognition activities which are usually considered belong to quantum realm.

But we admit that our model is still in its infancy, more researches are needed to fill all the missing details. Further observations and experiments are recommended to verify the above propositions.

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How Many Points are there in a Line Segment? – A new answer from Discrete-Cellular Space viewpoint

Victor Christianto, Florentin Smarandache

ABSTRACT

While it is known that Euclid's five axioms include a proposition that a line consists at least of two points, modern geometry avoid consistently any discussion on the precise definition of point, line, etc. It is our aim to clarify one of notorious question in Euclidean geometry: how many points are there in a line segment? – from discrete-cellular space (DCS) viewpoint. In retrospect, it may offer an alternative of quantum gravity, i.e. by exploring discrete gravitational theories. To elucidate our propositions, in the last section we will discuss some implications of discrete cellular-space model in several areas of interest: (a) cell biology, (b) cellular computing, (c) Maxwell equations, (d) low energy fusion, and (e) cosmology modelling.

Keywords: discrete-cellular space, discrete cosmology models, lattice universe, cellular automata, cell biology, cellular computing

> "*...I consider it quite possible that physics cannot be based on the field concept, i.e., on continuous structures. In that case nothing remains of my entire castle in the air gravitation theory included, -and of- the rest of modern physics.*" A. Einstein

1. Introduction

So many students from all ages have asked this question: *how many points are there in a line segment?* And a good math teacher will answer politely: in the circumference of a circle there are infinite number of points[1]. Similarly one can also ask: how many lines

are there in a rectangular? The answer again is known: there are infinite number of lines in given rectangular.

But a careful student will ask again: but what is the definition of point and line? Teacher will answer again: a point is a circle with zero diameter, and line is composed of infinite points.

If our beloved student persists, he/she will continue to ask: but teacher, if a circle has zero diameter, then an infinite number of zeroes will not make a finite line, isn't it?

At this time, there is fair chance that the teacher feel upset and say: "*shut up and calculate*!"

That is what usually happens in most primary school mathematics classroom, and the situation is not getting better in undergraduate classroom. Only in graduate math class, then the students are allowed to ask numerous questions, such as foundations of mathematics etc. A more serious debate among mathematicians over this notorious *continuum problem* has been recorded in ref. [11].

Here we will offer a simpler solution of the above posed question from a discrete-cellular space (DCS) viewpoint, with wide implications, including more clarity over distinction between quantization and discretization.

2. Solution: the space consists of circles with finite diameter (discrete cellular model)

The obvious paradox that we set in the introduction section can be simplified as follows:

$$0+0+0+\ldots.\textit{ad infinitum} = 0$$

Therefore the basic postulate that a line segment consists of circles with zero diameter is contradictory by itself.

Our proposed solution is to assume that the space consists of circles with small but finite diameter (z), therefore if a line segment consists of circles like that, we have:

z+z+z+ …*ad infinitum* = finite line

One implication of this proposition is that we should better consider the geometry of space not as continuum, but as a discrete-cellular space. And we must remember that discretization of space is much more fundamental than quantization.

Moreover, we can consider the following:

a. It can be shown that similar indeterminacy problem plagues the very definition of differential calculus, as no one knows that actual size of dx. See H.J.M. Bos [2]:

> **2.15.** *I turn now to a difficulty which necessarily arises in any attempt to set up an infinitesimal calculus which takes the differential as fundamental concept, namely the indeterminacy of differentials.*
>
> *The first differential dx of the variable x is infinitely small with respect to x, and it has the same dimension as x. These are the only conditions it has to satisfy, and they do not determine a unique dx, for if dx satisfies the conditions then clearly so do $2dx$ and $\frac{1}{2}dx$ and in general all $a\,dx$ for finite numbers a. That is, all quantities that have the same dimension and the same order of infinity as dx might serve as dx.*
>
> *Moreover, there are elements not from this class which satisfy the conditions for dx; for instance dx^2/a and $\sqrt{a\,dx}$, for finite positive a of the same dimension as x. dx^2/a is infinitely small with respect to dx and $\sqrt{a\,dx}$ is infinitely large with respect to dx, so that there is even not a privileged class of infinite smallness from which dx has to be chosen; there is no "first" class of infinite smallness adjacent to finiteness. Thus first-order differentials involve a fundamental indeterminacy.*

b. Boyer has shown that Planck blackbody radiation can be derived from discrete charge assumption (without partition as assumed by Planck). See [3].

c. Lee Smolin has described three approaches to quantum gravity in his book[4]. But considering our proposition above, it seems that the notion of quantum gravity may be not necessary. Instead, we should consider discrete gravity theories.

d. Gary W. Gibbons and George F.R. Ellis have considered a discrete Newtonian cosmology. That is a good start [5].

e. Gerard ‘t Hooft has proposed a discrete deterministic interpretation of QM.[6] But it seems the use of both discrete and quantum language are superfluous. We need to let go the quantum terminology with its own excess baggage.

f. At astronomical scale, Conrad Ranzan has proposed a cellular universe, which is essectially a Newtonian Steady-State model but with a discrete cellular space model.[7] In our view, such an approach needs to be explored and investigated further. See also our recent paper, where we suggest an ultradiscrete KdV as model of cosmology [8]. See also Lindquist-Wheeler model [9][10]. We discuss this approach in the last example of last section of this paper.

g. It may be possible for certain conditions, to consider a partially continuum and partially discrete space. In other words, we may have a hybrid space. But we do not investigate it yet.

3. A bit of philosophical considerations

According to Miguel Lorente, in order to understand better these models it would be useful to consider three levels of human knowledge in the comprehension of the physical world[12]:

> Level 1: Physical magnitudes, such as distances, intervals, force, mass, charge, that are given by our sensation and perceptions.
>
> Level 2: Mathematical structures, that are the result of metrical properties given by measurements and numerical relations among them.
>
> Level 3: Fundamental concepts, representing the ontological properties of physical world given by our intelligence in an attempt to know the reality. This

level of knowledge is not accepted by some philosophical positions like logical positivismus, conventionalismus, neokantismus.

There must be some connections between the three levels. In QM the theoretical models of microphysics in level 2 are related to observable magnitudes in level 1 by correspondence laws. If we accept level 3 it should be connected to level 2 and to level 1 (through level 2). In fact, the rules governing the constructions of theoretical models in level 2 must be grounded in some fundamental (ontological) properties of the physical world.

It is also worth noting that there are different interpretations of the concepts of space and time. They are usually divided in three classes, as follows [12]:

(a) Dualistic theories: Space is a container where the particles and waves are moving. Time is also a separated entity with respect to which the motion takes place. Therefore space and time are absolute and can be thought of in the absence of particles (Newton).

(b) Monistic theories: Spacetime is identified with some properties of matter and can not be concevible without the existence of the later. The field of forces and also the sources are nothing more that geometrical deformations of the Spacetime (Einstein, Kaluza-Klein, Wheeler).

(c) Relational theories: Spacetime consists of the set of relations among some fundamental objects: monads (Leibniz), units (Penrose), processes (Weisaecker, Finkelstein), preparticles (Bunge, Garc´ıa Sucre), objects (Hilbert).

In the present paper, following our argument in the previous section, we assert that the space consists of discrete cells with finite dimension, which is the most realistic model to

the best of our knowledge. Next we will discuss some implications in different areas of interest.

4. Proof of concept: A few implications of discrete-cellular space

To elucidate our propositions, in this section we will discuss some implications of discrete cellular-space model in several areas of interest: (a) cell biology, (b) cellular computing, (c) Maxwell equations, (d) low energy fusion, and (e) cosmology modelling.

(a) **Cell biology.** The mathematical modeling of cell populations can be, broadly speaking, split into two categories: continuum and discrete models. Discrete models treat cells as individual entities and hence provide a natural framework within which to make use of an increasing amount of experimental data available at the cellular and subcellular scales. There are now many different types of discrete cell-level models used to describe cell populations, e.g., cellular automata, cellular Potts models, cell-vertex, and off-lattice cell based model. [19]

While continuum models have their own advantages, they also have certain limitations, as follows [20]: Continuum models of the cell aim at capturing its passive dynamics. In addition to the limitations mentioned above, current models do not yet typically account for active biology: deformations and stresses experienced as a direct consequence of biochemical responses of the cell to mechanical load cannot be predicted by current continuum models. However, by contrasting the predicted purely mechanical cell response to experimental observations, one could isolate phenomena involving active biology, such as cell contraction or migration, from the passive mechanical response of the cell. Alternatively, continuum models might be

envisioned that account for active processes through time-dependent properties or residual strains that are linked to biological processes. Another limitation of continuum models stems from lack of description of cytoskeletal fibers. As such, they are not applicable for micromanipulations of the cell with a probe of the same size or smaller than the cytoskeletal mesh (~0.1–1.0 μm). This includes most AFM experiments. In addition, the continuum models exclude small Brownian motions due to thermal fluctuations of the cytoskeleton, which would correspond to fluctuations of the network nodes in a continuum model and have been shown to play a key role in cell motility (Mogilner and Oster, 1996). Finally, continuum models have so far employed a limited number of time constants to characterize the cell's behavior. However, cells have recently been shown to exhibit behaviors with power-law rheology implying a continuous spectrum of time scales (Fabry et al., 2001; Desprat et al., 2004). In the meantime, models involving a finite number of time constants consistent with the time scale of the experimental technique can be used, recognizing their limitations.[20]

(b) **Cellular computer**. Around 18 years ago, Sipper described a number of interesting features of cellular computer. He began his article by noting that von Neumann's architecture—which is based upon the principle of one complex processor that sequentially performs a single complex task at a given moment—has dominated computing technology for the past 50 years. Recently, however, researchers have begun exploring alternative computational systems based on entirely different principles. Although emerging from disparate domains, the work behind these systems shares a common computational philosophy, which can be called as cellular

computing [21]. Those cellular computers are supposed to have three principles in common. Combining these three principles results in the definition cellular computing = simplicity + vast parallelism + locality. Because the three principles are highly interrelated, attaining vast parallelism, for example, is facilitated by the cells' simplicity and local connectivity. Changing any single term in the equation results in a different computational paradigm. So, for example, foregoing the simplicity property results in the distributed computing paradigm. Cellular computing has been placed further along the parallelism axis to emphasize the "vastness" aspect.[21] What specific application areas invite a cellular computing approach? Research has raised several possibilities: (1) Image processing. Applying cellular computers to perform image-processing tasks arises as a natural consequence of their architecture. For example, in a two-dimensional grid, a cell (or group of cells) can correspond to an image pixel, with the machine's dynamics designed to perform a desired image-processing task. Research has shown that cellular image processors can attain high performance and exhibit fast operation times for several problems. (2) Fast solutions to NP-complete problems. Even if only a few such problems can be dealt with, doing so may still prove highly worthwhile. NP-completeness implies that a large number of hard problems can be efficiently solved, given an efficient solution to any one of them. The list of NP-complete problems includes hundreds of cases from several domains, such as graph theory, network design, logic, program optimization, and scheduling, to mention but a few. (3) Generating long sequences of high-quality random numbers. This capability is of prime import in domains such as computational physics and computational chemistry. Cellular computers may prove a

good solution to this problem. (4) Nanoscale calculating machines. Cellular computing's ability to perform arithmetic operations raises the possibility of implementing rapid calculating machines on an incredibly small scale. These devices could exceed current models' speed and memory capacity by many orders of magnitude. (5) Novel implementation platforms. Such platforms include reconfigurable digital and analog processors, molecular devices, and nanomachines.[21]

(c) **Maxwell equations.** While X.S. Wang[23] was able to derive the above mentioned Maxwell's equations in vacuum based on a continuum mechanics model of vacuum and a singularity model of electric charges, in the meantime Krasnoholovets has managed to show quite remarkably that the very definition of charge can be modelled from the viewpoint of tessellatice space.[22] He argued that the Maxwell Equations are the manifestation of hidden dynamics of surface fractals. He also concludes that James Clerk Maxwell was right when he involved imaginary *cogwheels* constructing the equations of motion of the electromagnetic field [22, p. 128].

(d) **Low energy fusion**. Since the early years of Condensed Matter Nuclear Science (aka. LENR/Cold fusion), Robert W. Bussard from Energy/Matter Conversion Corporation has argued in favor of internal nuclear fusion in metal lattice to explain the low energy reaction as reported by Pons and Fleischmann.[24] Subsequently, there are a number of researchers who have explored the implications of lattice vibration and lattice structure models from solid state physics in order to explain CMNS process.[25][26][27]. Such approaches seem to be quite promising and they are

worthy to continue further. For a recent discussion on discrete and continuum modelling, see for instance [28].

(e) **Cosmology modelling**. Many physicists and philosophers alike have debated a long standing puzzle: whether the space is continuous or discrete. It has been known for long time that most of the existing cosmology models rely on pseudo-Riemannian metric as the cornerstone of Einsteinian universe. But the metric itself is based on continuum theory. It is known that such models have led us to too many (monster) problems, including dark matter and dark energy etc. Now what if the universe is discrete? Then perhaps we can solve these problems naturally. Philosophically speaking, the notion of discrete space can be regarded as basic question in definition of differential calculus and limit. If it is supposed that space is continuous then we can use standard differential calculus, but if we assume it is finite and discrete, then we should use difference equation or finite difference theories. This problem is particularly acute when we want to compute our mathematical models in computers, because all computers are based on discrete mathematics. Then we can ask: is it possible that the discrete mathematics can inspire cosmology theorizing too? Despite majority of cosmologists rely on such a Standard Model which is called Lambda CDM theory, we will explore here the redshift theory based on a few of lattice-cellular models, including Lindquist-Wheeler theory and beyond it. We will also touch briefly some peculiar models such as Voronoi tessellattice and also Conrad Ranzan's cellular model of the Universe.

a. Lindquist-Wheeler's theory:

In this model, the matter content is assumed to be discrete; identical spherically symmetric islands uniformly distributed in a regular lattice. This attempt was first introduced in 1957 by Lindquist and Wheeler (LW) in a seminal paper. While LW suggested that their global dynamics is similar to Friedmann universe for closed dust dominated universe, Shalaby has shown that LW-model can be extended to yield a redshift equation, as follows:[9]

$$1+z=1+\langle\gamma\rangle\ln\left(\frac{a_r}{a_e}\right)=1+\langle\gamma\rangle\ln(1+z_{FRW})\cong(1+z_{FRW})^{\langle\gamma\rangle} \quad (1)$$

It can be shown, that the value of $\langle\gamma\rangle$ approximates geometrically to be 2/3, however, numerically its value was estimated to be 7/10.[9] Liu also analyzed LW model, and he concludes that the LW redshifts can differ from their FLRW counterparts by as much as 30%, even though they increase linearly with FLRW redshifts, and they exhibit a non-zero integrated Sachs-Wolfe effect, something which would not be possible in matter-dominated FLRW universes without cosmological constant. [10]

b. Voronoi Tessellation model:

Rien van de Weygaert describes a novel model based on Voronoi tessellation. The spatial cosmic matter distribution on scales of a few up to more than a hundred Megaparsec displays a salient and pervasive foam-like pattern.[14] Voronoi tessellations are a versatile and flexible mathematical model for such weblike spatial patterns. Cellular patterns may be the source of an intrinsic geometrically biased clustering. However, so far we do not find a redshift equation from this model.[13]

c. Non-expanding cellular universe:

Conrad Ranzan suggests a DSSU cellular cosmology (dynamics steady state universe), which he claims to be problem-free. The cosmic redshift is shown to be a velocity-differential effect caused by a flow differential of the space medium. He obtains the cosmic redshift equation in its basic form:[7]

$$z = (1 + z_{GC})^N - 1 \quad (2)$$

There are of course other cellular cosmology models, some of them have been reviewed by Marmet, but this paper is not intended for such an exhaustive list of redshift models. See Marmet [18].

5. Concluding Remarks

An old question and paradox in Euclidean geometry may be resolved consistently, once we accept and assume a discrete space instead of continuum model which is full of indeterminacies.

Many implications and further developments can be expected both in particle physics realm and also in cosmology theorizing. More observation and experiments are recommended to verify whether the space is discrete, continuous, or hybrid.

In retrospect, it may offer an alternative of quantum gravity, i.e. by exploring discrete gravitational theories. To elucidate our propositions, in the last section we discuss some implications of discrete cellular-space model in several areas of interest: (a) cell biology, (b) cellular computing, (c) Maxwell equations, (d) low energy fusion, and (e) cosmology modelling.

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Towards Soliton Computer Based on Solitary Wave Solution of Maxwell-Dirac equation: A Plausible Alternative to Manakov System

Victor Christianto, Florentin Smarandache

ABSTRACT

In recent years, there are a number of proposals to consider collision-based soliton computer based on certain chemical reactions, namely *Belousov-Zhabotinsky* reaction, which leads to soliton solutions of coupled Nonlinear Schroedinger equations. They are called Manakov System. But it seems to us that such a soliton computer model can also be based on solitary wave solution of Maxwell-Dirac equation, which reduces to Choquard equation. And soliton solution of Choquard equation has been investigated by many researchers, therefore it seems more profound from physics perspective. However, we consider both schemes of soliton computer are equally possible. More researches are needed to verify our proposition.

1. Introduction: early development of soliton science

There is little doubt that soliton technology has recently achieved close to pop science status as its proponents seek to put it to use for transporting vast amounts of information—the stuff that gives our era its name—farther and faster. It could well become one of the fundamental technologies in the current communications revolution. It was during the Industrial Revolution, however, that this phenomenon was first noticed and studied.[1]

A Scottish engineer by the name of John Scott Russell had set out to create a more efficient hull design for canal boats (a 19th-century forerunner, perhaps, of current efforts

to speed packets of information along fiber-optic cables). One day in August of 1834, he stood beside Union Canal near Edinburgh to observe the movement of a boat being pulled by two horses. As the rope pulling the boat snapped and the boat's movement halted, its prow dropped back down and Scott Russell saw a large mass of water, a smooth, solitary wave, gather around the prow and continue rapidly down the channel. Surprised and intrigued, he followed on horseback and noticed that the wave held its shape and only very gradually diminished in height. He lost sight of it after a mile or two but was so taken with this observation that he built a 30-foot wave tank in his back yard to study the phenomenon further. Ten years later, he reported his observations to the British Association for the Advancement of Science, calling what he had observed the "wave of translation." Scott Russell considered that day back in 1834 "the happiest day of my life", but his discovery was ignored by all but one or two people, who felt compelled to prove him wrong in the scientific literature. After all, it was common knowledge that waves could not behave in this way.[1]

Vindication came from two independent camps, both of which were attempting to explain the movement of shallow water waves. Boussinesq's equation in 1872 and the Korteweg–de Vries (KdV) equation in 1895 proved that solitary waves were, indeed, theoretically possible. Many theoretical and experimental developments have been done since then.

By the early 1980s, however, fiber-optic technology had caught up somewhat, and Linn Mollenauer, Roger Stolen, and Jim Gordon were able to observe soliton propagation in the lab. As mathematical results continued to appear, this group at Bell Labs was experimenting intensively with optical solitons, looking for ways to use them in long-

distance telecommunication systems. Ironically, while their work was enthusiastically received in scientific circles, it seemed that the practical application could not be quickly realized, and they were told by the head of research, Arno Penzias, to desist.

Doggedly, they persisted until their results were so compelling that Penzias apologized and publicly praised the work. Mollenauer's group has since achieved several long-distance and speed records for optical soliton transmission.[1]

2. Recent development: soliton computer possibility

It is a known fact in computer industry, that the present silicon technology cannot keep up with the Moore's law. Therefore new ways of developing unconventional computing methods are being carried out in many labs.

Since 2005, some researchers from Princeton University have reported a new concept of soliton computing. As data rates in optical communication systems continue to increase, the demand for all-optical signal processing and computing devices does as well. Examples of such devices include the nonlinear optical loop mirror, the temporal soliton dragging gate, the spatial soliton deflection gate, and the TOAD, an asymmetric loop mirror. These devices avoid the bottleneck associated with optical-electrical conversion.[2] They describe physical state-restoring computation using collisions of optical solitons. Their work is part of a larger subject known as collision-based computing, sometimes called dynamical computation. Such constructions include ideal collisions of billiard balls, Conway's universal game of Life, and multidimensional excitable lattices. Early work on soliton computation involved soliton-like collisions in

cellular automata, which demonstrated the ability to embed computation in automata using particles. [2]

In their initial study, Rand et al, consider a Manakov system, which is essentially a system of coupled NLSE, where q1 (x, t) and q2 (x, t) are two interacting optical components, μ is a positive parameter representing the strength of the nonlinearity, and x and t are normalized space and time, respectively. The two components can be thought of as components in two polarizations, or, as in the case of a photorefractive crystal, two uncorrelated beams.[2]

The Manakov system consists of two coupled NLSEs [18]:

$$i\frac{\partial q_1}{\partial t}+\frac{\partial^2 q_1}{\partial x^2}+2\mu(|q_1|^2+|q_2|^2)q_1=0$$

$$i\frac{\partial q_2}{\partial t}+\frac{\partial^2 q_2}{\partial x^2}+2\mu(|q_1|^2+|q_2|^2)q_2=0$$

Source: Rand et al.[2]

From a practical standpoint, successful soliton computation requires ideal interactions and error-free propagation. In this sense, it is analogous to the construction of Fredkin and Toffoli, in which ideal, elastic collisions of billiard balls were used to achieve universal and reversible computation. In reality, noise will cause variability in soliton propagation and collision, and fault tolerance based on logical state restoration would need to be implemented in order to improve system performance. In a sense, this is an analog rather than a digital computer. Rand et al. also reported more advanced work based on bistable configurations of Manakov solitons. [2]

More recent discussions of collision-based soliton computing still use that basic Manakov system. See [3][4].

In the next section we will discuss an alternative approach for soliton computer.

3. A plausible alternative: Soliton computer based on Choquard equation

In a recent paper, we discuss how Dirac-Maxwell equation reduces to wave equation, which can be transformed into a cellular-automaton scheme.[5]

Now, it is worthy to remark here that a recent paper shows that there is travelling wave solution of (classical) Dirac-Maxwell equation.[6]

It should be noted that numerical results showed that Dirac-Maxwell system has definitely many families of solitary waves. Here the nonnegative integer N denotes the number of nodes of the positronic component of the solution (number of zeros of the corresponding spherically symmetric solution to the Choquard equation).

It can be shown that the nonrelativistic limit of such a solitary wave solution takes the form of Choquard equation, which can be written as follows:[6]

$$\omega\phi = -\frac{1}{2m}\Delta\phi + q^2\Delta^{-1}\left(|\phi|^2\right)\phi. \tag{1}$$

Considering that the above Choquard equations is similar to the NLSE (nonlinear Schrodinger equation), and also that Manakov system is a system of coupled NLSE, then we consider it plausible to consider a Manakov-Choquard system as follows:

$$\omega\phi_1 = -\frac{1}{2m}\Delta\phi_2 + q^2\Delta^{-1}\left(|\phi_2|^2\right)\phi_1. \tag{2}$$

$$\omega\phi_2 = -\frac{1}{2m}\Delta\phi_1 + q^2\Delta^{-1}\left(|\phi_1|^2\right)\phi_2. \tag{3}$$

The solutions of (2) and (3) can be explored numerically with computer algebra system such as Mathematica.

As far as we know, such a Manakov-Choquard system has not been proposed before for studying soliton computer.

4. Concluding Remarks

Considering the everincreasing demand for better computers, some researchers have considered collision-based soliton computer. And this proposal is based on Manakov system. In this paper, we consider a new concept based on travelling wave solutions of Dirac-Maxwell equations, which we call Manakov-Choquard system.

As far as we know, such a Manakov-Choquard system has not been proposed before for studying soliton computer.

More observation and experiments are recommended to verify our propositions.

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It is more blessed to give than to receive: An Introduction to Neutrosophic Economics, a Heavenly GaTE principle, and Outline of New Development Path

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ABSTRACT

Starting from a well-known verse in Acts 20:35, we explore a new approach called *Neutrosophic Economics*, which can be summarized as GaTE principle (*Give and Take Economics*) – this term was inspired by Adam Grant's book: Give and Take. We submit wholeheartedly that this principle holds the key of individual, corporate and country's wealth, and it is more fundamental than Adam Smith's laissez faire and selfishness approach. In the meantime, Rostow's approach to economic development, summarized in *The Stages of Economic Growt*h, involved an economy passing through a sequence of well-defined phases. His growth theory has been accepted as development paradigm by many developing countries. Nonetheless, in the past recent years, it becomes clear that Rostow model imposes several weaknesses, namely debt and dependency problems. External debt increased exponentially in so many developing countries until it possesses risk of default, and also developing countries become much more dependent to technologies coming from the developed countries. In other words, we need a new path for development which may offer more liberating effects instead of making dependent islands here and there. And in this paper we consider *The Sharing-Cooperative-Solidarity Economy* as possible new development paradigm for developing countries. This is an outline paper, not so elaborated yet.

> Acts 20:35 New **King James** Version (NKJV). I have shown you in every way, by laboring like this, that you must support the weak. And remember the words of the Lord Jesus, that He said, 'It is more blessed to **give than to receive**.'"[1]

[1] https://www.bible.com/bible/114/ACT.20.35.nkjv

1. Introduction

In the last decade, we have tried to seek a new foundation for economics principles, which is inspired by human basic motives of kindness and altruism. Yes there are existing works on non-utilitarian philosophy, which is different from utilitarianism of Jeremy Bentham. But we seek a stronger principle for altruism.

Fortunately, there is a recent book by Prof. Adam Grant from Wharton School of Business: *Give and Take* [8]. Although this book does not discuss economics principles, it seems to us that Grant has outlined a stronger model than economics principle based on greed and selfishness, which plagued economics theories even since Adam Smith. And Give and Take principle (which we elevate with the abbreviation: **GaTE** principle), seems to correspond with a Biblical verse in Acts 20:35 as cited above.

In the last sections we will discuss how this model can be implemented in development economics path, especially with regards to what is called as "Sharing Economy."

2. An Introduction to Neutrosophic Economics

a. What is Neutrosophic Logic? [9][10][11]

Vern Poythress argues that sometimes we need a modification of basic philosophy of mathematics, in order to re-define the redeemed mathematics. See [13]. In this context, allow us to argue in favor of Neutrosophic logic as one basic postutale, in lieu of the Aristotle logic which creates many problems in real world.

In Neutrosophy, we can connect an idea with its opposite idea and with its neutral idea and get common parts, i.e. <A> /\ <nonA> = nonempty set. The common part of the uncommon things! It is true/real... paradox. From neutrosophy, all started: neutrosophic logic, neutrosophic set, neutrosophic probability,

neutrosophic statistics, neutrosophic measure, neutrosophic physics, neutrosophic algebraic structures etc.

It is true in restricted case, i.e. the Hegelian dialectics considers only the dynamics of opposites (<A> and <antiA>), but in our everyday life, not only the opposites interact, but the neutrals <neutA> between them too. For example: you fight with a man (so you both are the opposites). But neutral people around both of you (especially the police) interfere to reconcile both of you. Neutrosophy considers the dynamics of opposites and their neutrals.

So, neutrosophy means that: <A>, <antiA> (the opposite of <A>), and <neutA> (the neutrals between <A> and <antiA>) interact among themselves.

A neutrosophic set is characterized by a truth-membership function (T), an indeterminacy-membership function (I), and a falsity-membership function (F), where T, I, F are subsets of the unit interval [0, 1].

As particular cases we have: single-valued neutrosophic set {when T, I, F are crisp numbers in [0, 1]}, and interval-valued neutrosophic set {when T, I, F are intervals included in [0, 1]}.

Neutrosophic Set is a powerful structure in expressing indeterminate, vague, incomplete *and* inconsistent information.

b. Key insights from Adam Grant's book [8]

For generations, we have focused on the individual drivers of success: passion, hard work, talent, and luck. But today, success is increasingly dependent on how we interact with others. It turns out that at work, most people operate as either takers, matchers, or givers. Whereas takers strive to get as much as possible from

others and matchers aim to trade evenly, givers are the rare breed of people who contribute to others without expecting anything in return.

Using his own pioneering research as Wharton's top-rated professor, Adam Grant shows that these styles have a surprising impact on success. Although some givers get exploited and burn out, the rest achieve extraordinary results across a wide range of industries. Combining cutting-edge evidence with captivating stories, Grant shows how one of America's best networkers developed his connections, why the creative genius behind one of the most popular shows in television history toiled for years in anonymity, how a basketball executive responsible for multiple draft busts transformed his franchise into a winner, and how we could have anticipated Enron's demise four years before the company collapsed--without ever looking at a single number.

Give and Take highlights what effective networking, collaboration, influence, negotiation, and leadership skills have in common. This landmark book opens up an approach to success that has the power to transform not just individuals and groups, but entire organizations and communities

c. An outline of Neutrosophic Economics

Starting from Give and Take principle, we can ask: what is the stumbling block in people’s giving attitude? We consider the following observation: people who tend to give and practice altruism, usually have intrinsic “feeling safe and trust to others and God,” compared to people who normally refuse to give. In other words, the degree of giving-altruism attitude can be modelled as function of fear and trust. And one more thing: indeterminacy about one’s future. If one feels safe

about their life, their family and they are not afraid about indeterminacy of the future, it is more likely that they are more open to be a giver, rather than taker. But people who feel not safe (secure) on their life, or they are fear of their future, are more likely to be takers.

But what is trust? According to Simpson: “Trust is one of the most important components-and perhaps the most essential ingredient-for the development and maintenance of happy, well-functioning relationships (Fehr, 1988;Regan,Kocan, & Whitlock, 1998). Several lifespan theories, ranging from Bowlby's(1969, 1973) attachment theory to Erikson's (1963) theory of psychosocialdevelopment, contend that early exposure to relationships defined by strong trust laysthe foundation on whichmost future relationships are constructed. Without some basic level of trust, individuals are reluctant to initiate, invest in, or sustain most voluntary relationships (e.g.,with friends, recreation partners, and romantic partners). Indeed, trust appears to be crucial for the emergence of healthy and secure relationships (Holmes & Rempel, 1989; Larzelere & Huston, 1980), and the betrayal of trust is one of the most commonly mentioned reasons for the demise of relationships (Miller& Rempel, 2004).”[15]

Summarizing, we submit the view, that the basis of Neutrosophic Economics is that people’s adherence of Give and Take (GaTE) principle is influenced by T,I,F parameters (T: trust, I: indeterminacy, F: fear).

And ultimately, people who put trust on God to take care of their life are more likely to be a true giver, compared to those who are moved by mere humanitarian motives. This is an outline of Neutrosophic Economics (NE).

In the next section, we will see an implementation of NE in outlining new development path, which may be called: sharing-cooperation-solidarity (SCS) development path.

3. Implications to Development Economics

There is little doubt that the work of Rostow has had considerable influence in the fields of development economics and economic history. His best known work is *The Stages of Economic Growth,* which drew extensively on earlier studies. It is perhaps best summarized by the first few sentences of the introductory chapter: “This book presents an economic historian’s way of generalizing the sweep of modern history…” [1]

Nonetheless, there are critics to Rostow’s model too. For instance, in recent years, it becomes clear that Rostow model imposes several weaknesses, namely debt and dependency problems. External debt increased exponentially in so many developing countries until it possesses risk of default, and also developing countries become much more dependent to technologies coming from the developed countries.

In other words, we need a new path for development which may offer more liberating effect, and promoting *bottom-up initiatives* instead of making dependent islands here and there. And in this paper we consider The Sharing-Cooperative-Solidarity Economy as possible new development paradigm for developing countries. Our proposal is based on recent observation of rapid growth of sharing economy in many countries. We can expect that such a new business model will have tremendous impact to traditional business models.

This is an outline paper, not so elaborated yet.

4. Possible alternative: Sharing-Cooperative-Solidarity development path

There are many recent social innovations in recent years, including those which are accelerated by new technologies. But not only that, many social entrepreneurs are flourishing too, bringing new hope of integrating business profitability and social goals.

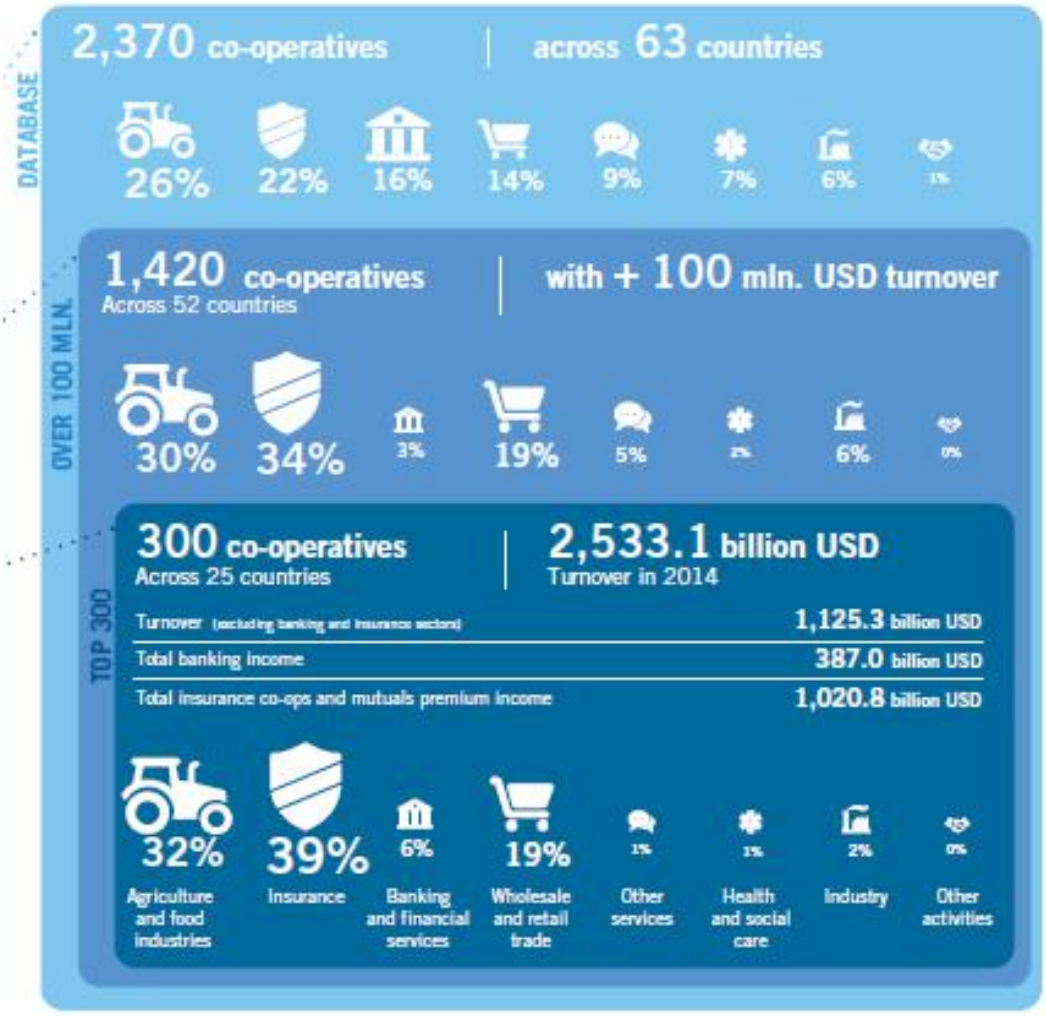
a. *Sharing economy*: Our proposal is based on recent observation of rapid growth of sharing economy in many countries, accelerated by shared hotel apps such as Airbnb and also by Uber taxi etc. We can expect that such a new business model will have tremendous impact to traditional business models.

b. *Cooperative economy*: Although the size of many cooperative initiatives are still small compared to commercial enterprises, but the cooperative organization grows significantly in recent years. [3]. Effect of market enhancing rules has been discussed by Grillo [4].

Table 1. Effects of market-enhancing rules on the working of cooperative firms

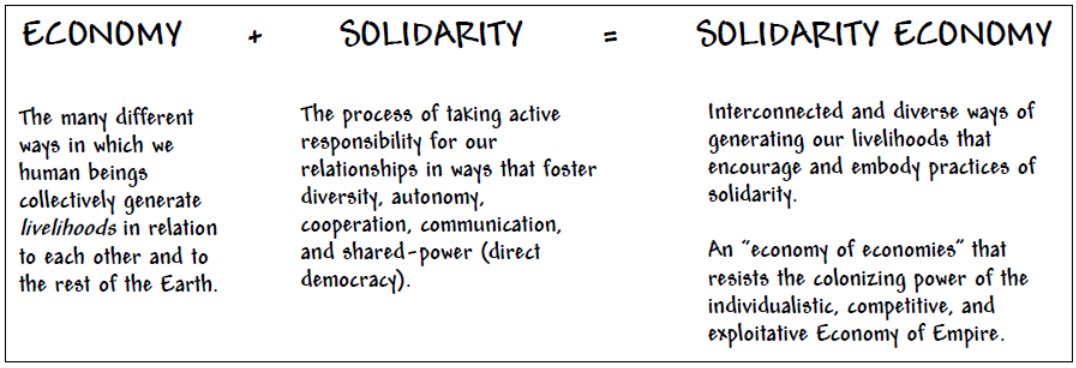
Cooperatives	Collective benefit	Effects of market-enhancing rules	
		For cooperatives	For society
workers cooperatives	*to prevent shirking*	neutral or beneficial	beneficial
	to prevent opportunism	detrimental	detrimental if no outside option are opened
			beneficial if no outside option are opened
customer (suppliers and consumers; credit) cooperatives	*to prevent deadweight loss*	detrimental	beneficial
	to prevent opportunism	detrimental	detrimental if no outside option are opened
			beneficial if no outside option are opened
	information transmission	detrimental	detrimental

The key figures of cooperative economics is shown below:[5]



c. *Solidarity economy*:[6] In Europe and many countries, solidarity economy becomes one of new buzz word, because it can prove itself to be a viable alternative to capitalistic way of life. After all, once an individual passes his/her threshold of minimum wage, there will be more freedom to actualize his/her potential, including for more meaningful activities such as expressing care and hospitality towards the needy. And that is the essence of becoming human. Neuroscience experiments also show that there is mysterious glow which is emitted from human brain, each time they do something good for others. This way of caring and nurturing have been

mostly neglected in traditional economic thinking, which emphasize that one should maximize profits for their whole life. This is likely to be the new way of life adopted by many Z generation and Millennial generations alike.


ECONOMY
+
SOLIDARITY
=
SOLIDARITY ECONOMY
The many different ways in which we human beings collectively generate *livelihoods* in relation to each other and to the rest of the Earth.
The process of taking active responsibility for our relationships in ways that foster diversity, autonomy, cooperation, communication, and shared-power (direct democracy).
Interconnected and diverse ways of generating our livelihoods that encourage and embody practices of solidarity.
An "economy of economies" that resists the colonizing power of the individualistic, competitive, and exploitative Economy of Empire.

Source: Ethan Miller [6]

FIGURE 4 Women weaving the entrails of a community built and operated anaerobic wastewater treatment plant for recycling domestic effluents for further use for agricultural production on communal lands in a highland community in Ixtlán de Juárez, Sierra Norte, Oaxaca. (Photo courtesy of Carlos Pailles, Director, Center for Ecological Support, Huatulco, Oaxaca, Mexico)

Source: David Barkin [7]

Therefore, we submit wholeheartedly that The Sharing-Cooperative-Solidarity economy can offer a better path for economic development for developing countries.

5. Concluding Remarks

Starting from a well-known verse in Acts 20:35, we explore a new approach called *Neutrosophic Economics*, which can be summarized as GaTE principle (*Give and Take Economics*) – this term was inspired by Adam Grant's book: Give and Take. We submit wholeheartedly that this

principle holds the key of individual, corporate and country's wealth, and it is more fundamental than Adam Smith's laissez faire and selfishness approach.

And in this paper we also consider *The Sharing-Cooperative-Solidarity Economy* as possible new development paradigm for developing countries. Our proposal is based on recent observation of rapid growth of sharing economy in many countries.

Therefore, we submit wholeheartedly that *The Sharing-Cooperative-Solidarity economy* can offer a better path for economic development for developing countries.

More observation and experiments are recommended to verify our propositions.

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Scientist, writer, and artist. Wrote in four languages: English, Romanian, French, and Spanish.

He did post-doctoral researches at Okayama University of Science (Japan) between 12 December 2013 - 12 January 2014; at Guangdong University of Technology (Guangzhou, China), 19 May - 14 August 2012; at ENSIETA (National Superior School of Engineers and Study of Armament), Brest, France, 15 May - 22 July 2010; and for two months, June-July 2009, at Air Force Research Laboratory in Rome, NY, USA (under State University of New York Institute of Technology).

Graduated from the Department of Mathematics and Computer Science at the University of Craiova in 1979 first of his class graduates, earned a Ph. D. in Mathematics from the State University Moldova at Kishinev in 1997, and continued postdoctoral studies at various American Universities such as University of Texas at Austin, University of Phoenix, etc. after emigration.

In U.S. he worked as a software engineer for Honeywell (1990-1995), adjunct professor for Pima Community College (1995-1997), in 1997 Assistant Professor at the University of New Mexico, Gallup Campus, promoted to Associate Professor of Mathematics in 2003, and to Full Professor in 2008.
Between 2007-2009 he was the Chair of Math & Sciences Department.

In mathematics he introduced the degree of negation of an axiom or theorem in geometry (see the Smarandache geometries which can be partially Euclidean and partially non-Euclidean, 1969, http://fs.gallup.unm.edu/Geometries.htm), the multi-structure (see the Smarandache n-structures, where a weak structure contains an island of a stronger structure, http://fs.gallup.unm.edu/Algebra.htm), and multi-space (a combination of heterogeneous spaces) [http://fs.gallup.unm.edu/Multispace.htm].
He created and studied in number theory many:
sequences (http://mathworld.wolfram.com/SmarandacheSequences.html, http://mathworld.wolfram.com/ConsecutiveNumberSequences.html),
functions (http://mathworld.wolfram.com/SmarandacheFunction.html, http://mathworld.wolfram.com/SmarandacheCeilFunction.html, http://mathworld.wolfram.com/Smarandache-KurepaFunction.html, http://mathworld.wolfram.com/Smarandache-WagstaffFunction.html, http://mathworld.wolfram.com/SmarandacheNear-to-PrimorialFunction.html, http://mathworld.wolfram.com/PseudosmarandacheFunction.html),
numbers (http://mathworld.wolfram.com/SmarandacheNumber.html,

**http://mathworld.wolfram.com/Smarandache-WellinNumber.html),
prime numbers (http://mathworld.wolfram.com/SmarandachePrime.html,
http://mathworld.wolfram.com/Smarandache-WellinPrime.html),
and constants (http://mathworld.wolfram.com/SmarandacheConstants.html).**

He generalized [1995] the fuzzy, intuitive, paraconsistent, multi-valent, dialetheist logics to the 'neutrosophic logic' (also in the Denis Howe's Dictionary of Computing, England) and, similarly, he generalized the fuzzy set to the 'neutrosophic set' (and its derivatives: 'paraconsistent set', 'intuitionistic set', 'dialethist set', 'paradoxist set', 'tautological set') [http://fs.gallup.unm.edu/ebook-neutrosophics6.pdf].

He coined the words "neutrosophy" [(French *neutre* < Latin *neuter*, neutral, and Greek *sophia*, skill/wisdom) means knowledge of neutral thought**] and its derivatives: neutrosophic, neutrosophication, neutrosophicator, deneutrosophication, deneutrosophicator, etc.**

In 2003 together with W. B. Vasantha Kandasamy he introduced the Neutrosophic Algebraic Structures, based on sets of Neutrosophic Numbers [i.e. numbers of the form a+bI, where a, b are real or complex numbers, and I = Indeterminacy, with I^n = I for n positive non-null integer, 0I = I, I/I = undefined, and nI+mI = (n+m)I].

**In 2006 he introduced the degree of dependence/independence between the neutrosophic components T, I, F.
In 2007 he extended the neutrosophic set *to Neutrosophic Overset (when some neutrosophic component is > 1), and to Neutrosophic Underset (when some neutrosophic component is < 0), and to Neutrosophic Offset (when some neutrosophic components are off the interval [0, 1], i.e. some neutrosophic component > 1 and some neutrosophic component < 0). Then, similar extensions to respectively Neutrosophic Over/Under/Off Logic, Measure, Probability, Statistics etc.*
http://fs.gallup.unm.edu/NeutrosophicOversetUndersetOffset.pdf**

Then, introduced the Neutrosophic Tripolar Set* and *Neutrosophic Multipolar Set, also the Neutrosophic Tripolar Graph* and *Neutrosophic Multipolar Graph.

He then generalized the Neutrosophic Logic/Set/Probability to Refined Neutrosophic Logic/Set/Probability [2013], where T can be split into subcomponents T_1, T_2, ..., T_p, and I into I_1, I_2, ..., I_r, and F into F_1, F_2, ..., F_s, where p+r+s = n ≥ 1. Even more: T, I, and/or F (or any of their subcomponents T_j , I_k, and/or F_l) could be countable or uncountable infinite sets: http://fs.gallup.unm.edu/n-ValuedNeutrosophicLogic-PiP.pdf .

In 2015 he refined the indeterminacy *"I"*, within the neutrosophic algebraic structures, into different types of indeterminacies (depending on the problem to solve), such as $I_1, I_2, , I_p$ with integer $p \geq 1$, and obtained the *refined neutrosophic numbers* of the form $N_p = a+b_1I_1+b_2I_2+ +b_pI_p$ where $a, b_1, b_2, , b_p$ are real or complex numbers, and *a* is called the determinate part of N_p, while for each k *in* $\{1, 2, , p\}$ I_k is called the *k*-th indeterminate part of N_p.

Then consequently he extended the neutrosophic algebraic structures to Refined Neutrosophic Algebraic Structures [or Refined Neutrosophic I-Algebraic Structures] (2015), which are algebraic structures based on sets of the refined neutrosophic numbers $a+b_1I_1+b_2I_2+ +b_pI_p$.

He introduced the (T, I, F)-Neutrosophic Structures [2015]. In any field of knowledge, each structure is composed from two parts: a space, and a set of axioms (or laws) acting (governing) on it. If the space, or at least one of its axioms (laws), has some indeterminacy, that structure is a *(T, I, F)*-Neutrosophic Structure. And he extended them to the *(T, I, F)-Neutrosophic I-Algebraic Structures* [2015], i.e. algebraic structures based on neutrosophic numbers of the form *a+bI*, but also having indeterminacy related to the structure space (elements which only partially belong to the space, or elements we know nothing if they belong to the space or not) or indeterminacy related to at least an axiom (or law) acting on the structure space. Then he extended them to *Refined (T, I, F)-Neutrosophic Refined I-Algebraic Structures.*

**Together with A. Salama he introduced in 2015 the neutrosophic crisp set and neutrosophic crisp topology [
http://fs.gallup.unm.edu/NeutrosophicCrispSetTheory.pdf].**

**In 2014 he founded together with Mumtaz Ali the Neutrosophic Triplet and introduced the neutrosophic triplet algebraic structures [
http://fs.gallup.unm.edu/NeutrosophicTriplets.htm].**

**In 2016 he founded the Neutrosophic Duplets [
http://fs.gallup.unm.edu/NeutrosophicDuplets.htm].**

Together with A. R. Vatuiu he enounced the Law that *it is easier to break from inside than from outside a neutrosophic dynamic system* [http://fs.gallup.unm.edu/EasierMaiUsor.pdf].

Also, he proposed an extension of the classical probability and the imprecise probability to the 'neutrosophic probability' [1995], that he defined as a tridimensional vector whose components are real subsets of the non-standard interval]-0, 1+[, introduced the neutrosophic measure and neutrosophic integral [http://fs.gallup.unm.edu/NeutrosophicMeasureIntegralProbability.pdf], and also extended the classical statistics to neutrosophic statistics [http://fs.gallup.unm.edu/NeutrosophicStatistics.pdf].

Since 2002, together with Dr. Jean Dezert from Office National de Recherches Aeronautiques in Paris, worked in information fusion and generalized the Dempster-Shafer Theory to a new theory of plausible and paradoxist fusion (Dezert-Smarandache Theory): http://fs.gallup.unm.edu/DSmT.htm .
In 2004 he designed an algorithm for the Unification of Fusion Theories and rules (UFT) used in bioinformatics, robotics, military.

In biology he introduced in 2017 the Theory of Neutrosophic Evolution: Degrees of Evolution, Indeterminacy, and Involution [http://fs.gallup.unm.edu/neutrosophic-evolution-PP-49-13.pdf].

In physics he found a series of paradoxes (see the quantum smarandache paradoxes), and considered the possibility of a third form of matter, called unmatter [2004], which is a combination of matter and antimatter - presented at Caltech (American Physical Society Annual Meeting, 2010) and Institute of Atomic Physics (Magurele, Romania 2011).

Based on a 1972 manuscript, when he was a student in Rm. Valcea, he published in 1982 the hypothesis that 'there is no speed barrier in the universe and one can construct any speed', (http://scienceworld.wolfram.com/physics/SmarandacheHypothesis.html). This hypothesis was partially validated on September 22, 2011, when researchers at CERN experimentally proved that the muon neutrino particles travel with a speed greater than the speed of light.
Upon his hypothesis he proposed an Absolute Theory of Relativity [free of time dilation, space contraction, relativistic simultaneities and relativistic paradoxes which look alike science fiction not fact]. Then he extended his research to a more diversified Parameterized Special Theory of Relativity (1982): http://fs.gallup.unm.edu/ParameterizedSTR.pdf and generalized the Lorentz Contraction Factor to the Oblique-Contraction Factor for lengths moving at an oblique angle with respect to the motion direction, then he found the Angle-Distortion Equations (1983): http://fs.gallup.unm.edu/NewRelativisticParadoxes.pdf .
He considered that the speed of light in vacuum is variable, depending on the moving reference frame; that space and time are separated entities; also the redshift and blueshift are not entirely due to the Doppler Effect, but also to the Medium Gradient and Refraction Index (which are determined by the medium composition: i.e. its physical elements, fields, density, heterogeneity, properties, etc.); and that the space is not curved and the light near massive cosmic bodies bends not because of the gravity only as the General Theory of Relativity asserts (Gravitational Lensing), but because of the Medium Lensing.
In order to make the distinction between clock and time , he suggested a *first experiment* with different clock types for the GPS clocks, for proving that the resulted dilation and contraction factors are different from those obtained with the cesium atomic clock; and a *second experiment* with different medium compositions for proving that different degrees of redshifts/blushifts and different degrees of medium lensing would result.

He introduced the superluminal and instantaneous physics (domains that study the physical laws at superluminal and respectively instantaneous velocities), and the neutrosophic physics that describes collections of objects or states that are individually characterized by opposite properties, or are characterized neither by a property nor by the opposite of the property. Such objects or states are called neutrosophic entities.

In philosophy he introduced in 1995 the 'neutrosophy', as a generalization of Hegel's dialectic, which is the basement of his researches in mathematics and economics, such as 'neutrosophic logic', 'neutrosophic set', 'neutrosophic probability', 'neutrosophic statistics'.
Neutrosophy is a new branch of philosophy that studies the origin, nature, and scope of neutralities, as well as their interactions with different ideational spectra. This theory considers every notion or idea <A> together with its opposite or negation <Anti-A> and the spectrum of "neutralities" <Neut-A> (i.e. notions or ideas located between the two extremes, supporting neither <A> nor <Anti-A>). The <Neut-A> and <Anti-A> ideas together are referred to as <Non-A>. According to this theory

every idea <A> tends to be neutralized and balanced by <Anti-A> and <Non-A> ideas - as a state of equilibrium. As a consequence, he generalized the triad thesis-antithesis-synthesis to the tetrad thesis-antithesis-neutrothesis-neutrosynthesis [http://fs.gallup.unm.edu/neutrosophy.htm].

He extended the Lupasco-Nicolescu s *Law of Included Middle* [<A>, <nonA>, and a third value <T> which resolves their contradiction at another level of reality] to the *Law of Included Multiple-Middle* [<A>, <antiA>, and <neutA>, where <neutA> is split into a multitude of neutralities between <A> and <antiA>, such as <neut$_1$A>, <neut$_2$A>, etc.]. The <neutA> value (i.e. neutrality or indeterminacy related to <A>) actually comprises the included middle value. Also, he extended the *Principle of Dynamic Opposition* [opposition between <A> and <antiA>] to the *Principle of Dynamic Neutrosophic Opposition* [which means oppositions among <A>, <antiA>, and <neutA>]; [http://fs.gallup.unm.edu/LawIncludedMultiple-Middle.pdf].

Invited to lecture at University of Berkeley (2003), NASA Langley Research Center-USA (2004), NATO Advance Study Institute-Bulgaria (2005), Jadavpur University-India (2004), Institute of Theoretical and Experimental Biophysics-Russia (2005), Bloomsburg University-USA (1995), University Sekolah Tinggi Informatika & Komputer Indonesia-Malang and University Kristen Satya Wacana Salatiga-Indonesia (2006), Minufiya University (Shebin Elkom)-Egypt (2007), Air Force Institute of Technology Wright-Patterson AFB in Dayton [Ohio, USA] (2009), Universitatea din Craiova - Facultatea de Mecanica [Romania] (2009), Air Force Research Lab & Griffiss Institute [Rome, NY, USA] (2009), COGIS 2009 (Paris, France), ENSIETA (Brest, Franta) - 2010, Romanian Academy - Institute of Solid Mechanics and Commission of Acoustics (Bucharest - 2011), Guangdong University of Technology (Guangzhou, China) - 2012, Okayama University of Sciences (Japan) - 2013, Osaka University (Japan) - 2014, Universidad Nacional de Quilmes (Argentina) - 2014, Universidad Complutense de Madrid (Spain) - 2014, Univ. Transilvania Brasov - 2015; Vietnam National University, Le Quy Don Technical University (Hanoi) and Hanoi University, also Ho Chi Minh City University of Technology (HUTECH) and Nguyen Tat Thanh University (Ho Chi Minh City) - 2016, Universidad de Guayaquil (Ecuador) - 2016 etc.
Presented papers at many Sensor or Information Fusion International Conferences {Australia - 2003, Sweden - 2004, USA (Philadelphia - 2005, Seattle - 2009, Chicago - 2011, Washington DC - 2015), Spain (Barcelona - 2005, Salamanca - 2014), Italy - 2006, Belgium - 2007, Canada -2007, Germany (Cologne - 2008, Heidelberg - 2016), Scotland- 2010, Singapore - 2012, Turkey - 2013}.

Presented papers at IEEE GrComp International Conferences (Georgia State University at Atlanta - 2006, Kaohsiung National University in Taiwan - 2011), International Conference on Advanced Mechatronic Systems (Tokyo University of Agriculture and Technology, Japan) - 2012, IEEE World Congress on Computational Intelligence (Vancouver, Canada, 2016), Federal University of Agriculture - Abeokuta & University of Ibadan & University of Lagos (Nigeria, 2017), COMSATS Institute of Information Technology (Abbottabad, Pakistan; 2017), Jeju National University (S. Korea, 2018).

He received the 2011 Romanian Academy "Traian Vuia" Award for Technical Science (the highest in the country); *Doctor Honoris Causa* of Academia DacoRomana from Bucharest - 2011, and *Doctor Honoris Causa* of Beijing Jiaotong University (one of the highest technical universities of China) - 2011;
the 2012 New Mexico - Arizona Book Award & 2011 New Mexico Book Award at the category Science & Math (for Algebraic Structures, together with Dr. W. B. Vasantha Kandasamy) on 18 November 2011 in Albuquerque; also, the Gold Medal from the Telesio-Galilei Academy of Science from England in 2010 at the University of Pecs - Hungary (for the Smarandache Hypothesis in physics, and for the Neutrosophic Logic), and the Outstanding Professional Service and Scholarship from The University of New Mexico - Gallup (2009, 2005, 2001).

Very prolific, he is the author, co-author, editor, and co-editor of 180 books published by about forty publishing houses (such as university and college presses, professional scientific and literary presses, such as Springer Verlag (in print), Univ. of Kishinev Press, Pima College Press, ZayuPress, Haiku, etc.) in ten countries and in many languages, and 250 scientific articles and notes, and contributed to over 100 literary and 50 scientific journals from around the world.

He published many articles on international journals, such as: Neural Computing and Applications (Springer), Applied Intelligence (Springer), Fuzzy Sets and Systems (Elsevier), International Journal of Uncertainty, Fuzziness and Knowledge-Based

Systems (IJUFKS) [World Scientific], Bulletin of the Research Institute of Technology (Okayama University of Science, Japan), Multiple-Valued Logic - An International Journal (now called Multiple-Valued Logic & Soft Computing) (UK & USA), Zentralblatt Für Mathematik (Germany; *reviewer*), Nieuw Archief voor Wiskunde (Holland), Advances in Fuzzy Sets and Systems, International Journal of Social Economics, International Journal of Applied Mathematics, International Journal of Tomography & Statistics (editor), International Journal of Applied Mathematics and Statistics (Editor-in-Chief 2005-2006), International Journal of Pure and Applied Mathematics, Gaceta Matematica (Spain), Intelligencer (Gottingen, Germany); Humanistic Mathematics Network Journal, Bulletin of Pure and Applied Sciences, Progress in Physics (Associate editor), Infinite Energy (USA), Information & Security: An International Journal, InterStat - Statistics on the Internet (Virginia Polytechnic Institute and State University, Blacksburg, USA), American Mathematical Monthly, Mathematics Magazine, Journal of Advances in Information Fusion (JAIF), Advances and Applications in Statistics, Far East Journal of Theoretical Statistics, Notices of the American Mathematical Society, Critical Review (Society for Mathematics of Uncertainty, Creighton University - USA), New Mathematics and Natural Computing (World Scientific), Bulletin of Statistics & Economics, International Journal of Artificial Intelligence, The Icfai University Journal of Physics, Hadronic Journal (USA), Studii si Cercetari Stiintifice (University of Bacau, Romania; associate editor), International Journal of Applied Mathematics and Statistics, Roorkee, India, (editor-in-chief 2005-2006?); Journal of Computer Science and Technology, Symmetry (Basel, Switzerland), Pakistan Journal of Statistics & Operational Research, International Journal of Mathematical Combinatorics, International Journal of Geometry, Studies in Logic Grammar and Rhetoric (Belarus), Global Journal of Science Frontier Research (GJSFR) [USA, UK, India], Int. J. Advanced Mechatronic Systems (Inderscience Publishers), Applied Mechanics and Materials (Trans Tech Publications, Switzerland), etc. and on many IEEE International Conference Proceedings. Some of them can be downloaded from the LANL / Cornell University and the CERN web sites.

During the Ceausescu's era he got in conflict with authorities. In 1986 he did the hunger strike for being refused to attend the International Congress of Mathematicians at the University of Berkeley, then published a letter in the Notices of the American Mathematical Society for the freedom of circulating of scientists, and became a dissident. As a consequence, he remained unemployed for almost two years, living from private tutoring done to students. The Swedish Royal Academy Foreign Secretary Dr. Olof G. Tandberg contacted him by telephone from Bucharest.
Not being allowed to publish, he tried to get his manuscripts out of the country through the French School of Bucharest and tourists, but for many of them he lost track.
Escaped from Romania in September 1988 and waited almost two years in the political refugee camps of Turkey, where he did unskilled works in construction in order to survive: scavenger, house painter, whetstoner. Here he kept in touch with the French Cultural Institutes that facilitated him the access to books and rencontres with personalities.
Before leaving the country he buried some of his manuscripts in a metal box in his parents vineyard, near a peach tree, that he retrieved four years later, after the 1989 Revolution, when he returned for the first time to his native country. Other manuscripts, that he tried to mail to a translator in France, were confiscated by the secret police and never returned.

He wrote hundreds of pages of diary about his life in the Romanian dictatorship (unpublished), as a cooperative teacher in Morocco ("Professor in Africa", 1999), in the Turkish refugee camp ("Escaped... / Diary From the Refugee Camp", Vol. I, II, 1994, 1998), and in the American exile - diary which is still going on.

But he's internationally known as the literary school leader for the "paradoxism" movement which has many advocates in the world, that he set up in 1980, based on an excessive use of antitheses, antinomies, contradictions, paradoxes (http://mathworld.wolfram.com/SmarandacheParadox.html)in creation - both at the small level and the entire level of the work - making an interesting connection between mathematics, philosophy, and literature [http://fs.gallup.unm.edu/a/paradoxism.htm].
He introduced the 'paradoxist distich', 'tautologic distich', and 'dualistic distich', 'paradoxist quatrain' etc. inspired from the mathematical logic

[http://fs.gallup.unm.edu/a/literature.htm].
Literary experiments he realized in his dramas: Country of the Animals, where there is no dialogue!, and An Upside-Down World, where the scenes are permuted to give birth to one billion of billions of distinct dramas!
[http://fs.gallup.unm.edu/a/theatre.htm].
He stated:
"Paradoxism started as an anti-totalitarian protest against a closed society, where

the whole culture was manipulated by a small group. Only their ideas and publications counted. We couldn't publish almost anything.
Then, I said: Let's do literature... without doing literature! Let's write... without actually writing anything. How? Simply: literature-object! 'The flight of a bird', for example, represents a "natural poem", that is not necessary to write down, being more palpable and perceptible in any language that some signs laid on the paper, which, in fact, represent an "artificial poem": deformed, resulted from a translation by the observant of the observed, and by translation one falsifies.
Therefore, a mute protest we did!
Later, I based it on contradictions. Why? Because we lived in that society a double life: an official one - propagated by the political system, and another one real. In mass-media it was promulgated that 'our life is wonderful', but in reality 'our life was miserable'. The paradox flourishing! And then we took the creation in derision, in inverse sense, in a syncretic way. Thus the paradoxism was born. The folk jokes, at great fashion in Ceausescu's 'Epoch', as an intellectual breathing, were superb springs.
The "No" and "Anti" from my paradoxist manifestos had a creative character, not at all nihilistic." Paradoxism, following the line of Dadaism, Lettrism, absurd theater, is a kind of up-side down writings!
In 1992 he was invited speaker in Brazil (Universidad do Blumenau, etc.).

He did many poetical experiments within his avant-garde and published paradoxist manifestos: "Le Sens du Non-Sens" (1983), "Anti-chambres/Antipoesies/ Bizarreries" (1984, 1989), "NonPoems" (1990), changing the French and respectively English linguistics clich s. While "Paradoxist Distiches" (1998) introduces new species of poetry with fixed form.
Eventually he edited three International Anthologies on Paradoxism (2000-2004) with texts from about 350 writers from around the world in many languages.

"MetaHistory" (1993) is a theatrical trilogy against the totalitarianism again, with dramas that experiment towards a total theater: "Formation of the New Man", "An Upside - Down World", "The Country of the Animals". The last drama, that pioneers no dialogue on the stage, was awarded at the International Theatrical Festival of Casablanca (1995).
He translated them into English as "A Trilogy in pARadOXisM: avant-garde political dramas"; and they were published by ZayuPress (2004).
"Trickster's Famous Deeds" (1994, auto-translated into English 2000), theatrical trilogy for children, mixes the Romanian folk tradition with modern and SF situations.

His first novel is called "NonNovel" (1993) and satirizes the dictatorship in a gloomy way, by various styles and artifice within one same style.

"Faulty Writings" (1997) is a collection of short stories and prose within paradoxism, bringing hybrid elements from rebus and science into literature.

His experimental albums "Outer-Art" (Vol. I, 2000 & Vol. II: The Worst Possible Art in the World!, 2003) comprises over-paintings, non-paintings, anti-drawings, super-photos, foreseen with a manifesto: "Ultra-Modernism?" and "Anti-manifesto"
[http://fs.gallup.unm.edu/a/oUTER-aRT.htm].
Art was for Dr. Smarandache a hobby. He did:
- graphic arts for his published volumes of verse: "Anti-chambres/ Anti-po sies/ Bizarreries" (mechanical drawings), "NonPoems" (paradoxist drawings), "Dark Snow" & "Circles of light" (covers);
- paradoxist collages for the "Anthology of the Paradoxist Literary Movement", by J. -M. Levenard, I. Rotaru, A. Skemer;
- covers and illustrations of books, published by "Dorul" Publ. Hse., Aalborg, Denmark;
- illustrations in the journal: "Dorul" (Aalborg, Denmark).
Many of his art works are held in "The Florentin Smarandache Papers" Special Collections at the Arizona State University, Tempe, and Texas State University, Austin (USA), also in the National Archives of Valcea and Romanian Literary Museum (Romania), and in the Musee de Bergerac (France).

Twelve books were published that analyze his literary creation, among them: "Paradoxism's Aesthetics" by Titu Popescu (1995), and "Paradoxism and Postmodernism" by Ion Soare (2000).
He was nominated by the Academia DacoRomana from Bucharest for the 2011 Nobel Prize in Literature for his 75 published literary books.

Hundreds of articles, books, and reviews have been written about his activity around the world. The books can be downloaded from this
Digital Library of Science: http://fs.gallup.unm.edu/ScienceLibrary.htm
and from the Digital Library of Arts and Letters:
http://fs.gallup.unm.edu/LiteratureLibrary.htm .

As a Globe Trekker he visited 54 countries that he wrote about in his memories. In 2015 he went to an expedition in Antarctica (see his Photo Gallery at: http://fs.gallup.unm.edu/photo/GlobeTrekker.html).

International Conferences:
First International Conference on Smarandache Type Notions in Number Theory, August 21-24, 1997, organized by Dr. C. Dumitrescu & Dr. V. Seleacu, University of Craiova, Romania.
International Conference on Smarandache Geometries, May 3-5 2003, organized by Dr. M. Khoshnevisan, Griffith University, Gold Coast Campus, Queensland, Australia.
International Conference on Smarandache Algebraic Structures, December 17-19, 2004, organized by Prof. M. Mary John, Mathematics Department Chair, Loyola College, Madras, Chennai - 600 034 Tamil Nadu, India.

[Presentation by Dmitri Rabounski, Progress in Physics]

A Short Biography of the Authors: Victor Christianto

He was born in East Java, Indonesia, and he grew up there and enrolled in Brawijaya State University. Then he worked as an engineer from 1993-2000. In 2000 he changed his career to database and webdevelopment until November 2008. In December 2008 he was granted a scholarship to study gravitation and cosmology at the Institute of Gravitation and Cosmology of the Peoples' Friendship University of Russia (RUDN) in Moscow. But he did not complete the study because of some reasons.

He returned to Indonesia from Moscow at May 30, 2009, and worked again until October 2009. In October 2009, in a prayer Jesus Christ asked him: "Victor Christianto, do you love Me?" three times, just like in Gospel of John 21:15-17. So he repented and renewed his faith in Jesus Christ, and then he works only for Jesus Christ until now as an independent researcher. He has completed a master degree in theology (MTh) in September 2014 from Satyabhakti Advanced School of Theology (www.sttsati.org). He works now as a bible editor since April 2015. And since August 2015, he holds Doctor of Divinity and also he begins administering www.Sci4God.com. It is a new social networking site dedicated for dialogue between math, science, and theology. Visit and join with us at http://www.Sci4God.com.

He loves science as well as theology topics. His particular interests are gravitation, electromagnetic, mathematics and cosmology. He has published more than 17 books

either independently or together with Prof. Florentin Smarandache and other scientists, including:

(1) Victor Christianto. Manajemen Proyek berbasis Internet.

(2) Victor Christianto. Oracle JSP: Sebuah Pengantar.

(3) Multi-Valued Logic, Neutrosophy, and Schrodinger Equation (2006).

(4) Unfolding the Labyrinth: Open Problems in Physics, Mathematics, Astrophysics and other Areas of Science (2007).

(5) Quantization in Astrophysics, Brownian Motion and Supersymmetry (2007).

(6) Hadron Models and related New Energy issues (2008).

(7) Cultural Advantage for Cities: An alternative for developing countries (2008).

(8) Cultural Advantages in China / Tale of Six Cities (2009).

(9) Neutrosophic Logic, Wave Mechanics, and Other Stories (Selected Works 2005-2008) (2009).

(10) Quantization and Discretization at Large Scales (2012).

(11) Some Problems of Nuclear Energy Development in Asia (2013),

(12) Clan Capitalism, Graph Distance, and Other Issues (2013), URL: http://www.gallup.unm.edu/~smarandache/ClanCapitalism.pdf

(13) Florentin Smarandache , Victor Christianto. A Journey into Quantization in Astrophysics (2013).

(14) Victor Christianto. Grace for you: 44 Guides for Living inspired by Jesus Christ. Saarbrucken, Germany: Blessed Hope Publishing, 2013.
URL: https://www.morebooks.de/store/gb/book/grace-for-you/isbn/978-3-639-50070-7

(15) Victor Christianto. A.L.I.C.E. with Jesus: A Life-Changing Experience with Jesus. Saarbrucken, Germany: Blessed Hope Publishing, 2014.
Available at URL: https://www.morebooks.de/store/gb/book/a-l-i-c-e-with-jesus/isbn/978-3-639-50080-6

(16) Victor Christianto. Drink the New Wine: Experience God in your daily life. Saarbrucken, Germany: Blessed Hope Publishing, 2014. Available at www.morebooks.de

(17) Victor Christianto. Seeking a Theory for the End of the World: Introduction to Fractal Vibrating String. Saarbrucken, Germany: LAP-Lambert Academic Publishing, 2014.

He also has published 8 books (in Kindle digital format) under guidance of Jesus Christ, as follows:

(1) Articles dictated by Jesus Christ. Book One. URL:
http://www.amazon.com/dp/B00AYR6TJU

(2) Articles dictated by Jesus Christ. Book Two. URL:
http://www.amazon.com/dp/B00AYR3F9C

(3) by Jesus Christ: How social darwinism ruin America and the World. URL:
http://www.amazon.com/dp/B00AZDJJQI

(4) by Jesus Christ: Evangelism for Difficult People. URL:
http://www.amazon.com/dp/B00AZDJCLA

(5) by Jesus Christ: How you can do Evangelism with Social Media. URL:
http://www.amazon.com/dp/B00AZDXZLI

(6) by Jesus Christ: The Nicene Creed. URL: http://www.amazon.com/dp/B00AZDYMJ2

(7) by Jesus Christ: Logos, Memra, and other letter for Economists. URL:
http://www.amazon.com/dp/B00AZDY7JW

(8) by Jesus Christ: our Father in Heaven prayer. URL:
http://www.amazon.com/dp/B00AZKZUNM

He also published more than 45 scientific papers, some of them are available in vixra.org. You can send email to him at victorchristianto@gmail.com or vic104@hotmail.com. Supervisors: Prof. Vladimir V. Kassandrov, Dr. Paskalis Edwin Nyoman Paska, Drs. Gani Wiyono, Th.M, and Prof. Florentin Smarandache

Victor Christianto
*Founder and Technical Director, www.ketindo.com
E-learning and consulting services in renewable energy
**Founder of Second Coming Institute, www.sci4God.com
Http://www.facebook.com/vchristianto
Twitter: @Christianto2013, Line: @ThirdElijah, IG: @ThirdElijah
***books: http://nulisbuku.com/books/view_book/9035/sangkakala-sudah-ditiup
http://nulisbuku.com/books/view_book/9694/sastra-harjendra-ajaran-luhur-dari-tuhan-

a5
http://www.unesco.chair.network.uevora.pt/media/kunena/attachments/731/ChristologyReloaded_Aug2016.pdf
http://fs.gallup.unm.edu/APS-Abstracts/APS-Abstracts-list.htm
http://independent.academia.edu/VChristianto
Http://researchgate.net/profile/Victor_Christianto/
http://www.amazon.com/Victor-Christianto/e/B00AZEDP4E
http://nulisbuku.com/books/view_book/9661/teologi-yesus-sobat-kita-10-artikel-dialog-antara-teologi-dan-sains
http://nulisbuku.com/books/view_book/9693/jalan-yang-lurus-manual-anak-anak-terang-a5
http://www.mdpi.com/journal/mathematics/special_issues/Beyond_Quantum_Physics_Computation

Resume

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Website: http://www.sci4God.com

Victor Christianto, Ir. (Engineer), MTh., D.Div.

https://www.researchgate.net/profile/Victor_Christianto

Education

Oct 2014 – Aug 2015	**Jerusalem Christian Bible College, Malawi (http://www.cypressbiblecollege.org)** Doctor of Divinity, Theology Malawi, Malawi
Aug 2011 – Sep 2014	**Satyabhakti Advanced School of Theology, INDONESIA (http://www.sttsati.org/)** Master of Theology, Theology , Indonesia
Dec 2008 – Jun 2009	**Institute of Gravitation and Cosmology at Peoples's Friendship University of Russia, at Moscow (www.rudn.ru)** Msc but not completed, Gravitation and cosmology Moscow, Moscow, Russia
Aug 1987 – Sep 1992	**Engineering Faculty, Brawijaya State University, INDONESIA (http://www.ub.ac.id)** Bachelor of Engineering, Engineering , Indonesia

Thesis

Victor Christianto: *Critical review to Robert Eisenman (Thesis summary)*. 09/2014, Degree: MTh (Master of Theology), Supervisor: Dr. Paskalis Edwin Nyoman Paska & Drs. Gani Wiyono, MTh., Th.M.

Victor Christianto: *TINJAUAN KRITIS TERHADAP PANDANGAN EISENMAN TENTANG KONTRADIKSI ANTARA PAULUS DAN YAKOBUS (Thesis preview)*. 09/2014, Degree: MTh (Master of Theology), Supervisor: Dr. Paskalis Edwin Nyoman Paska & Drs. Gani Wiyono, MTh., Th.M.

Research Experience

Statistics

RG Score	22.61
Publications	240
Reads	20,810
Citations	357

Awards & Grants

Dec 2008	Scholarship: He was granted scholarship in the Institute of Gravitation and Cosmology at the Peoples's Friendship University in Russia, Moscow
Oct 2000	Award: Second national award of Nokia WAP HotHouse Contest

Skills & Activities

Skills	Quantum Mechanics, Theoretical Physics, General Relativity, Cosmology, Gravitational Physics, Oracle 9i, MySQL Database, PHP, Maxima software, Microsof sql, Computational Physics, Applied / Experimental Physics, Measurement, Dark Energy, Condensed Matter Theory, Special and General Relativity, Quantum Cosmology, Quantum Field Theory, Gravitation, Astrophysics, Nature of Science, Solar System, Galaxy, Heuristics, Immanuel Kant, Space, Observation, Dark Matter, Fractals, Astronomy & Astrophysics, Cognitive Behavioral Therapy, Electrodynamics, Mathematica, High Energy Physics, Photonics,

	Relativity, Theoretical Particle Physics, High Energy Physics Theory, Theoretical High Energy Physics, Climatology, Papers, Presentations, Early Christian History, Hermeneutics, Theology, Acoustics, Church History, Maxwell, Mathematical Physics, Maxwell's Equations, Culture, Review, Articles, Christian Theology, Classical Archaeology, Foundations of Physics, Logic, Numerics, Physical Cosmology, Covariance, Astroparticle Physics, Nuclear Fusion, Energy, Applied Mathematics, Computer Algebra
Languages	Bahasa, English, Indonesia
Scientific Memberships	International Society of Frontier Science (www.isfs.org.in)
Interests	Database development and design, web development, economics, Christian theology, Dead Sea Scrolls, history of early Christianity, renewable energy technologies, cosmology, electromagnetic theory, DNA

Publication Highlights

Books

Victor Christianto: *Jalan yang Lurus: Manual anak-anak Terang*. June 2017 edited by Victor Christianto, 06/2017; Second Coming Institute, www.sci4God.com.

Victor Christianto: *Sastra Harjendra: Ajaran Luhur dari Tuhan*. June 2017 edited by Victor Christianto, 06/2017; Second Coming Institute, www.sci4God.com.

Victor Christianto: *Six Easy Pieces in Computational Physics: Exploration with Mathematica*. May 2017 edited by Victor Christianto, 05/2017; Second Coming Institute, www.sci4God.com.

Victor Christianto: *Christology Reloaded: Selected Papers 2010-2016*. July 2016 edited by Victor Christianto, 07/2016; www.sci4God.com.

Victor Christianto: *3 in 1: 3 buku dalam 1 file (in bahasa Indonesia)*. 2015 edited by Victor Christianto, 12/2015; Second Coming Institute, www.sci4God.com.

Victor Christianto: *A Biblical Theory of Everything inspired by the Johannine Prologue (cover preview)*. 2015 edited by Ms. Cornelia Schidu, 09/2015; Lambert Academic Publisher (LAP) - Saarbrucken, Germany., ISBN: 978-3-659-78041-7

Victor Christianto: *X-Files dalam Alkitab dan kisah-kisah lainnya (in bahasa Indonesia)*. 2015, Pentecostal day 05/2015; not yet published.

Victor Christianto: *Teologi Gundukan Pasir*. 2014 12/2014; Second Coming Institute, www.sci4God.com.

Victor Christianto: *Seeking a Theory for the End of the World: Introduction to Fractal Vibrating String*. 2014 edited by Ms. Cornelia Schidu, 07/2014; LAP Publishing, Saarbrucken, Germany (http://www.lap-publishing.com)., ISBN: 978-3-659-58074-1, DOI:10.13140/2.1.2289.7603

V. Christianto, Florentin Smarandache: *Die Kunst des Wedelns, F. Smarandache, V. Christianto & Bernd Hutschenreuther*. 2013 edited by Florentin Smarandache, 06/2013; InfoLearnQuest, USA., ISBN: 978-1-59973-055-4

Florentin Smarandache, V. Christianto: *A Journey into Quantization in Astrophysics: A collection of scientific papers*. 01/2013;

F. SMARANDACHE, V. CHRISTIANTO: *NEUTROSOPHIC LOGIC, WAVE MECHANICS, AND OTHER STORIES*. 01/2009; , DOI:10.5281/zenodo.8715

V. Christianto, F. Smarandache: *Cultural Advantage for Cities An alternative for developing countries*. 01/2008;

Florentin Smarandache, V. Christianto: *The Art of Wag*. 01/2008;

F. Smarandache, V. Christianto: *Hadron models and related New Energy issues*. 03/2007; , DOI:10.5281/zenodo.8838

Book Chapters

Journal Publications

Victor Christianto: *On preparation for the Second Coming of Jesus Christ*.

Victor Christianto, Florentin Smarandache: *From Zeldovich Approximation to Burgers' equation: A Plausible Route to Cellular Automata Adhesion Universe*.

Victor Christianto, Florentin Smarandache: *Neutrosophic Regression and Possible Nonlinearity of Hubble Law: Some Preliminary Remarks*.

Victor Christianto, Florentin Smarandache, Yunita Umniyati: *A Newtonian-Vortex Cosmology Model from Solar System to Galaxy to Large Scale Structures: Navier-Stokes-Inspired Cosmography*.

Victor Christianto: *Kepemimpinan Trinitarian*.

victor christianto: *Sekularisme*.

Victor Christianto, Florentin Smarandache, Yunita Umniyati: *Redshift in Lattice-Cellular Models of the Universe: Lindquist-Wheeler and beyond*.

Victor Christianto, Florentin Smarandache, Yunita Umniyati: *Solving Numerically Ermakov-type Equation for Newtonian Cosmology Model with Vortex*.

Victor Christianto, Florentin Smarandache, Yunita Umniyati: *On Syntropy & Precognitive Interdiction Based on Wheeler-Feynman's Absorber Theory*.

Victor Christianto: *Daimonizomai: kerasukan setan dalam PL, PB dan pelayanan masa kini (Demonic Possession in OT, NT and Contemporary Ministry)*.

Victor Christianto, Florentin Smarandache: *A Review of Five Approaches of Quantum Potential Including Madelung Hydrodynamics Formulation*.

Victor Christianto: *Call for Paper - Jurnal Teologi Amreta*.

Victor Christianto, Sergey V Ershkov: *Solving Numerically a System of Coupled Riccati ODEs for Incompressible Non-Stationary 3D Navier-Stokes Equations*.

Victor Christianto, Florentin Smarandache, Yunita Umniyati: *A Short Introduction of Cellular Automaton Universe via Cosmological KdV Equation*.

Victor Christianto: *The True name of the Messiah*.

Victor Christianto, David Widihandojo: *Cin-cai dan Welasan: Ekonomi hospitalitas, suatu reinterpretasi atas Pasal 33 UUD 1945*.

Prespacetime Journal, Victor Christianto, Florentin Smarandache, Yunita Umniyati: *Exploration From Acoustic Analog of Space to Acoustic Sachs-Wolfe Theorem: A Model of the Universe as a Guitar*.

Victor Christianto: *A Theo-Cymatic reading of Prolegomena of St. John's Gospel: And Implications for Cosmology etc*.

Victor Christianto: *Two Applications of Riccati ODE in Nonlinear Physics and Their Computer Algebra Solutions*.

Victor Christianto: *Solving Coupled Riccati ODEs as Solution of Incompressible Non-stationary 3D Navier-Stokes equations*.

Victor Christianto: *Berlaku Adil di tahun baru 2017*.

Victor Christianto: *Natal KPR GKI Blimbing bersama PMK Kairos*.

Victor Christianto: *ILLUMINATI AND MEROVINGIAN*.

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Patents

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This book is a compilation of articles by Victor Christianto and Florentin Smarandache. In some papers, Volodymyr Krasnoholovets, Sergey Ershkov, and Yunita Umniyati also joined.

This compilation is inspired from a series of seminars by Rev. Jan Friso from Kingdom Impact, and also a discussion with Minister Dr. Robby Chandra.

The title: “Let the wind blow” contains multiple meanings:

- to let the wave physics to flow freely including in energy research, medicine etc.
- to let the Spirit to pour on everyone...

The message of this book is quite simple: we wish return a healthy dose of "realism" and “wave only” physics back into modern sciences. And if that will require us to debunk quantum mechanics and relativity, so be it. That is the theme of this book.

There will be objections, of course, on how we mix science and spirit. Thanks to those that are serious scientists who defend the right to be believer while keeping as a scientist, for example: Prof. Alister McGrath, Prof. John Lennox, Prof. John Polkinghorne, Prof. William Lane Craig, and others.

Our approach is unconventional as a science book. But Neutrosophic logic implies that one may choose intermediate state between science and religion. It is not a binary choice, we can choose both to be a good scientist and as a spiritual person.

The bottom line is: through this book we want to make a case that regardless of what those new atheists told you, it is possible to respect God while still being good scientists. We try to state our case through examples in different fields of science, including missiology, ecclesiology, and also medicine and economics.

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